Chemical & Engineering NEWS

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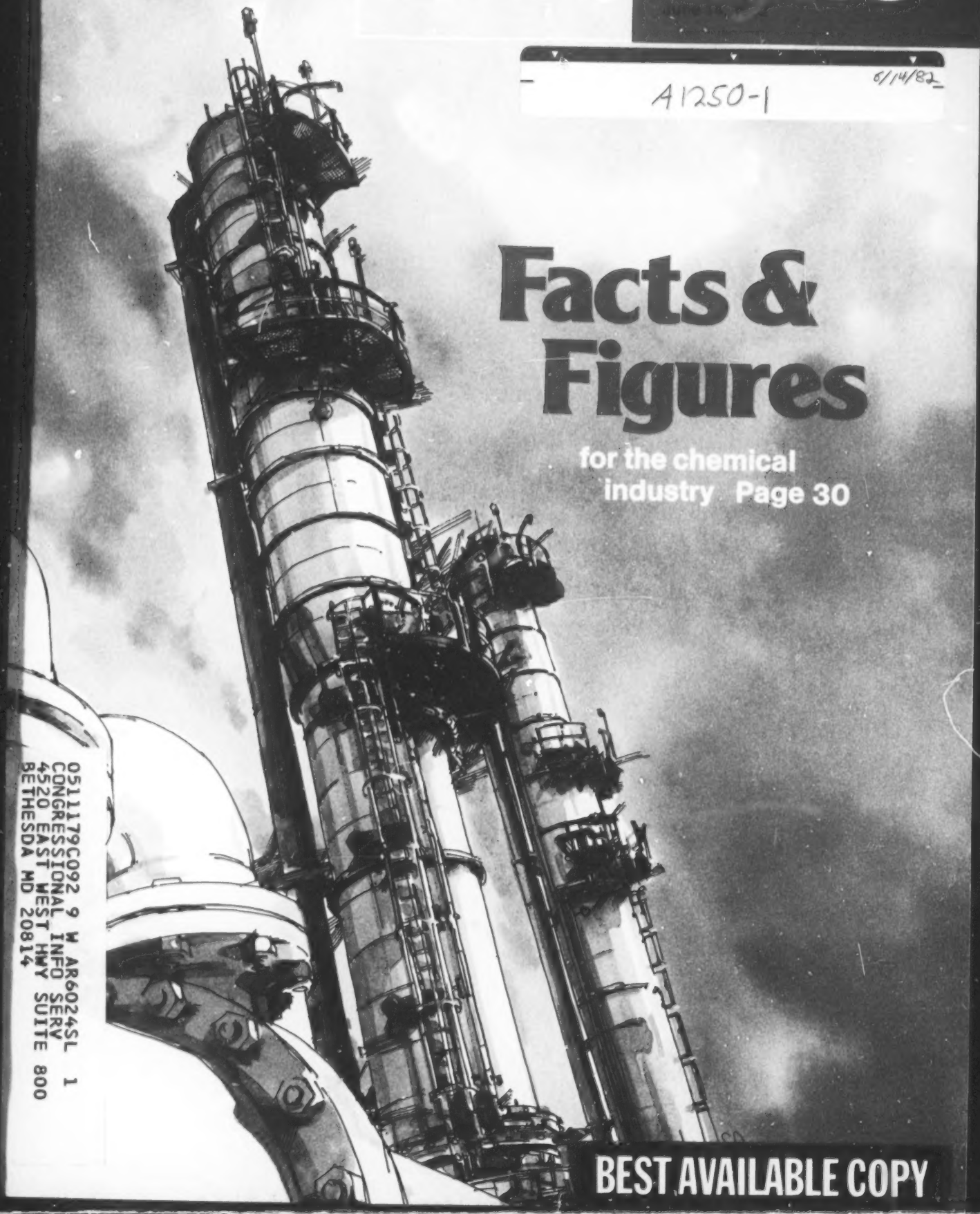

# Facts & Figures

for the chemical industry Page 30

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Chemical & Engineering NEWS

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## News of the Week

- ***Management control of Gulf Resources & Chemical*** *has been won by a group of dissident stockholders who plan to restructure the company.* ***Page 6***
- ***Soviet Union denies use of chemical warfare*** *in Southest Asia, charges toxins come from U.S. herbicide use in Vietnam.* ***Page 7***
- ***Employment of female scientists*** *and engineers rose 32% between 1974 and 1978, that of minorities 25%.* ***Page 7***
- ***FDA will require warning label*** *on aspirin-containing products, citing a link between aspirin use in children and development of Reye's syndrome.* ***Page 7***
- ***John C. Slaughter*** *leaves NSF directorship to become chancellor of the University of Maryland.* ***Page 8***
- ***Kuwaitis' share of stock*** *in West Germany's Hoechst is only 18%, not the 25% that was rumored earlier.* ***Page 8***

## Business

- ***Iodine is suffering*** *from low industrial demand and selling of stockpiled product from government inventories but expected future needs may find supply short.* ***Page 12***

## International

- ***Canadian methanol capacity*** *is far ahead of demand, leading Celanese Canada to compete with propane and compressed natural gas for the alternate fuels market.* ***Page 14***

## Government

- ***Personnel layoffs at the national labs,*** *prompted by proposed big cuts in Department of Energy budget, mean loss of both expertise and continuity of programs.* ***Page 17***

## Science

- ***New research on photosynthesis*** *provides insights on the mechanism of initial critical electron-transfer reactions.* ***Page 21***
- ***Funding for cancer researchers*** *in universities and private labs sought from foundations and companies to offset declining federal support.* ***Page 25***

## Education

- ***New graduate program*** *trains chemistry students for work in industry; Doctor of Chemistry degree will be awarded to chemists completing the program.* ***Page 28***

## Facts & Figures

***1981 was a disappointing year*** *for the chemical industry both in the U.S. and abroad; earlier predictions of an end to recession proved overoptimistic.* ***Page 31***

## Books

- ***Two books discuss evolution***—one promoting punctuated equilibria, the other recounting work with fossils. ***Page 82***

# Letters

## More on science education

SIR: In response to the story by Michael Heylin that appeared in C&EN, May 24, page 39, regarding high school science education, may I suggest that the problems of scientific literacy in the U.S. may be attacked (and solved) by the application of the following principles? They might be referred to as the 21st century version of the "three Rs"; because of current errors in societal thinking, we, as a nation, now have "five Rs."

1. RESTORE classroom discipline.
2. RETURN to the concept that formal education is a necessity and need not be fun and games.
3. REVISE teaching licensure requirements so that formal undergraduate preparation in the area to be taught (i.e., mathematics, sciences, etc.) becomes the dominant requirement, rather than courses in lesson plan preparation, educational psychology, and group dynamics.
4. REQUIRE six semesters of mathematics and six semesters of science for *all* secondary school students.
5. REJECT the idea that everyone must be identical (equal) in every aspect and accept the idea that individuals have qualitatively and quantitatively different talents and abilities.

Unless we, as a nation, are willing to accept these principles, any and all efforts of legislatures, conferences of experts, and appropriations of money will be merely empty gestures.

Roger P. Maickel

*Lafayette, Ind.*

SIR: How long do we have to relive history before we learn to remember some of it?! The prestigious speakers at the recent National Academy of Sciences convocation on science education (C&EN, May 24, page 39) remind one of the committee examining a camel . . . .

Fortunately, all agree that scientific competence of the public is a survival characteristic for cultural success, and we are dangerously close to becoming an endangered culture. However, cheap shots at past science education programs, such as the National Science Foundation's (the Reagan Administration's observation that they were a failure), ignore the fact that those programs fell short (if indeed they *did* fall short) only in that they were unable to make enough inroads on the entrenched pedagogic bureaucracy that was established through two centuries of decentralized, locally controlled education. Leadership has long been available in the scientific community to bolster our science education, and NSF's style of getting scientists to set science education policy and design effective programs began over 20 years ago. Don't blame them if the massive network of our educational system was able to bury them, and the federal commitment to quality never strong enough!

Unfortunately, no one comes forth with *why* science education is now on the wane. I think many science education leaders recognize the "why" to be a pervasive emphasis on processes at the expense of content, but, having seen the political results of bucking the traditional educational establishment, they shy away from proposing the expensive and painful solution of literally rebuilding an educational system. However, eventually we will acknowledge that we must pay science teachers what they are worth; we will insist on a system that elevates technical competence and uses pedagogy as a means rather than an end; we will accept that a technically literate America will cost REAL money; and we will demand a federal role that comprises leadership without dictatorship. The sooner the better.

J. C. Kellett Jr.

*Fairfax, Va.*

## The high cost of books

SIR: I just received a book ad from a major publisher of chemical books. It includes a new book that I should very much like to read. The 600-page book, of general interest to chemists, is described as " 'Must' reading for all involved in chemistry." It is priced at $95.95. Apparently the publisher anticipates a small volume of sale. The price tag absolutely guarantees a self-fulfilling prophecy.

A price tag of almost $100 for a medium-sized book of broad interest suggests to me one or more of four things. Either (a) more books are being published than can reasonably be expected to sell, or (b) book publishers are making monstrous profits, or (c) excessively expensive methods and materials are used in the design and printing of books, or (d) marketing strategies are badly faulted.

The first of these is almost certainly true. The second I doubt very much. The third is almost certainly true of most technical books today, but probably not true of most technical journals. The last may well be true of a broad range of literature from general interest books to *Chemical Abstracts*. Certainly very expensive publications will have a small volume of sale (and a correspondingly small readership?).

Are we moving toward a time when a large volume of technical literature will be available in only a single copy in the Library of Congress, so that we must all go to Washington to read it?

B. Spencer Meeks

*Professor of Chemistry, Moorhead State University, Moorhead, Minn.*

### Corrections

- May 17, page 9: The bars on the sales, earnings, profit margins, production, and prices graphs are labeled incorrectly—the last bar in each graph is for first-quarter 1982.
- May 31, page 24: Lewis M. Branscomb is still vice president and chief scientist at IBM. He is not a former employee as stated.


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**(For list of offices see page 95)**

# Surplus of iodine now, but shortage coming

**Slow industrial demand and federal stockpile reductions are depressing producers' sales, but soon rebounding demand will create shortage**

With the wounds inflicting the economy, a kiss and a dab of iodine won't make things better. But if it did, it also would help the iodine business, because many of the industries iodine is sold to are suffering with the slumping economy. And the outlook for iodine for the rest of the year is not promising. To top off the situation, when the iodine industry does turn around, it probably will enter a period of serious shortages.

This year, the iodine industry has been hit by a double whammy. First, the recession has soured many industries it sells to—and delayed the development of other promising markets. Indeed, iodine consumption this year is predicted to amount to only about 6.5 million lb—down from historical levels of about 8 million to 8.1 million lb per year. On its own, that would hurt U.S. suppliers, of whom there are only two—PPG Industries and Dow Chemical—and cut into imports, which long have been the mainstay of U.S. iodine supply. But another major factor has entered the business: The U.S. government late last year began selling stockpiled iodine to reduce its inventories.

"The government's sale couldn't have come at a worse time," says one iodine product manager. The sale of iodine was part of a general inventory-reduction program, but, this marketer says, the other commodities involved generally have been sold at the going market price. With iodine, on the other hand, the prices started out about 12% less than the market price of $6.53 to $6.54 per lb—itself discounted from a list price of about $7.25 per lb. The General Services Administration has indicated that it intends to sell 2.213 million lb from stockpile, so last year's sales and an expected 1 million lb this year will clear up most of that as a materials source.

However, while GSA is conducting its sales, and with the drop in demand this year, producers are trimming their capacity. U.S. capacity probably was a little shy of 2.5 million lb at the beginning of the year, with PPG accounting for 2 million lb per year at its Woodward, Okla., plant, and Dow the remainder at Midland, Mich.

And several announced projects are marking time, if not resting on the back burner. Calabrian International, a New York-based marketing firm that probably is the major importer of iodine in the U.S., had announced plans several years ago to build an iodine recovery plant, in conjunction with Ise Chemical Industries Ltd. Ise produces about half the iodine produced by Japanese interests, which in turn accounts for about half the world's supply. However, when marketers at Calabrian saw the slowdown and the GSA sales impending, "we stopped dead in our tracks" with the recovery plant, says one official there.

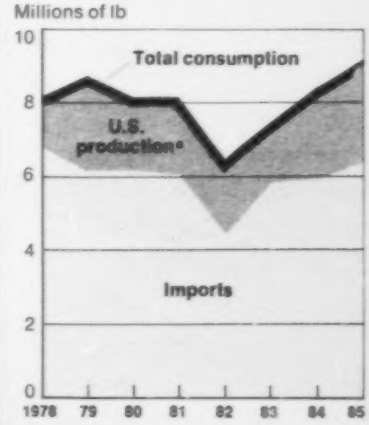
Dow had announced plans to build a new iodine extraction plant in southern California to complement its "senior-citizen" Midland operations, which date from 1927. Some Dow customers say they have been told the company has dropped the plans altogether, but Dow says that it is merely proceeding more slowly with them than it originally had anticipated.

A joint venture among Oklahoma City-based Beard Oil Co., Godoe USA (a subsidiary of Japanese iodine manufacturer United Resources Industry), and Inorgchem Developments Inc. was scheduled to come on stream this quarter, but has been delayed slightly. It will start up this fall. This venture, North American Brine Resources, initially plans three mini-units, for a combined capacity of 143,000 lb per year; it hopes to expand that capacity with more wells later on.

One problem facing North American Brine Resources may be low iodine levels in the brines, other producers believe. Most iodine is obtained as a by-product of bromine recovery, although the most recent production facilities, such as PPG's, which is a joint venture with Amoco Chemicals, are for iodine only. For bromine, a respectable concentration is in the 4000- to 5000-ppm range. For iodine, however, a "rich" brine contains a scant 300 ppm. With lower concentrations than that, producers can have difficulty running an economically efficient recovery process.

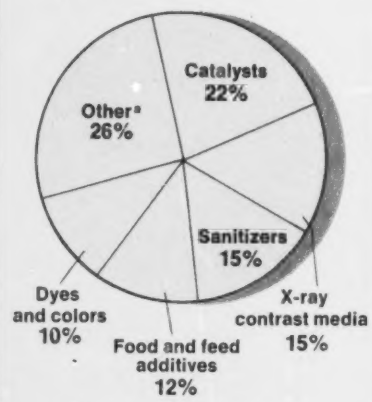
The prospects of improved busi-

**Imports dominate the iodine market**




a Includes stockpile sales from 1981 to 1983.
**Sources:** Bureau of Mines, C&EN estimates

**Where iodine goes**




**Total 1982 consumption = 6.5 million lb**

a Includes stabilizers (7%), photographic film (5%), other pharmaceutical (5%), and water treatment (4%).
**Sources:** Bureau of Mines, C&EN estimates

ness, however, have made the chance worth the effort. This year will be bleak, marketers agree, but next year will be much better—so much so, in fact, that the industry will be heading back into the shortage side of its traditional cycle.

This year, iodine has been carried by sales into the medical world, though not as simple tincture of iodine, which, incidentally, has fallen out of favor with medical practitioners. Major sales, rather, consist of far more sophisticated diagnostic agents such as sodium iodide scintillating crystals. These are used to pinpoint tumors, help determine the extent of damage in stroke cases, and assess brain damage in accident victims. An even larger market in diagnostics is with x-ray contrast media, basically iodinated amines of benzoic acid with as high as 47% iodine content. Injected into the bloodstream, the fluids—opaque to x-rays because of the high iodine content—reveal blood flow, outlines of various organs, and other diagnostic information. Recently developed formulations promise a more comfortable replacement for the barium sulfate used in gastrointestinal tests.

The other major use for iodine, as a catalyst for industrial processes, has suffered, however. Calabrian, for one, sees several large-scale end uses for iodine catalysts: methanol conversion to acetic acid, thermochemical power cycles using iodine, coal liquefaction catalysts, and hydrocarbon oxidative dehydrogenation. A generally depressed chemical industry, however, has been a poor customer for catalysts. And one of those major uses—coal liquefaction—is in danger of disappearing altogether as companies call off proposed projects.

Nevertheless, Calabrian president Charles A. Cogliandro see things picking up as Tennessee Eastman, for example, brings on stream its methanol-to-acetic acid plant this year. Next year, a similar plant is scheduled for Canada, with others scheduled for Taiwan and Yugoslavia—all boosting world demand for iodine, he says.

That kind of new demand, the ending of GSA sales, and a rebound in normal demand help make this year's surplus deceiving, marketers agree, with the industry heading into a period of significant shortages. By one prediction, demand will readily top 9 million lb in 1985. And even with imports from Japan and the other major importing country, Chile, there will be problems filling that demand.

*Patricia Layman, New York*

# CHECKOFF

## NEW PLANTS

■ **Aramid fiber**—Du Pont will increase capacity 20% during 1982 at Spruance plant near Richmond, Va.; material sold under Nomex tradename.

■ **Carbon dioxide**—Airco Industrial Gases will spend $3 million at Hopewell, Va., plant to raise capacity to more than 400 tons per day as part of $25 million program to expand company's carbon dioxide production.

■ **Chlorine**—Vulcan Chemicals will expand Geismar, La., plant 12%, bringing chlorine capacity to 675 tons per day and caustic soda capacity to 720 tons per day; project to be completed in fall 1983 at cost of $12.5 million.

■ **Fatty amides**—Witco Chemical will expand Memphis, Tenn., plant of its Humko Chemical division, raising capacity 50% to make both primary and secondary fatty amides used primarily as plastics additives; cost not disclosed; completion slated for first-quarter 1983.

■ **Gas processing**—Phillips Petroleum will build new unit near Dumas, Tex., to process cryogenically 60 million standard cubic feet per day of gas to remove nitrogen, crude helium, and $C_2$+ hydrocarbons. Work will be handled by Lotepro Corp., New York City, and will be completed in fourth quarter of 1982.

■ **Genetic products**—Genentech will build 72,000-sq-ft plant at South San Francisco, Calif., to make genetically engineered products such as human and animal growth hormones, interferons, and vaccines. Fluor subsidiary Daniel International will build plant, due for completion by end of 1982.

■ **Methyl *tert*-butyl ether**—Texas Olefins will build 25,000 metric-ton-per-year unit for making this gasoline additive on 200-acre site near Baytown, Tex. Accelerated completion date of end of 1982 is possible because company is partly using existing equipment that will use process technology licensed from Arco Technology.

■ **Polyvinyl chloride**—B. F. Goodrich will increase capacity 25% at Pedricktown, N.J., plant for making polymer as dispersion resin; cost not disclosed; completion scheduled for fourth-quarter 1983.

■ **Specialty chemicals**—Ferro Corp. will spend $6 million to expand plants at Hammond, Ind., and Bedford, Ohio, for flame-retardant additives and ultraviolet light stabilizers.

■ **Sulfonates**—Witco Chemical will add 50 million lb per year of continuous sulfonation capacity at Houston organics division plant at cost of about $8 million. When completed in first-quarter 1983, total capacity at site will be about 100 million lb.

## PLANTS COMPLETED

■ **Alum**—Allied Chemical has started up what it calls first new plant built by major supplier of aluminum sulfate in decade. Unit, at Ashdown, Ark., has capacity of 30,000 tons per year.

■ **Butylated hydroxy toluene**—Sherwin-Williams' chemical division has completed 10 million lb-per-year plant at Fords, N.J.; product used as an antioxidant.

■ **Chlorine**—Georgia - Pacific has started operational pilot plant at Phoenix using Diamond Shamrock technology and Du Pont's Nafion 901 membranes.

■ **Dyes**—Crompton & Knowles has added unit at Newark, N.J., plant to make several dyes used primarily in printing ink and paper industries.

■ **Insecticides**—Shell Chemical has started unit at Mobile, Ala., plant to make its Pydrin insecticide; product is structurally related to naturally occurring pyrethrins.

■ **Isocyanate**—BASF Wyandotte now is operating new diphenylmethane diisocyanate unit at Geismar, La. Capacity is 150 million lb per year, but current operations are at 100 million lb annual rate. Technology for process was developed at BASF in West Germany.

# Canadian methanol enters alternate fuel market

**With large supplies available because of booming capacity, methanol is in good position to compete with compressed natural gas and propane**

Celanese Canada, with its huge 700,000 metric-ton-per-year methanol plant at Edmonton, Alta., nearing completion, has decided to enter methanol in the Canadian alternate fuel sweepstakes.

Methanol will have to compete against several other contenders, including compressed natural gas and propane. Just how big a role, if any, methanol will play in the Canadian transportation fuel market still is unclear. But Celanese Canada is confident that, of them all, methanol is the one fuel that is capable of having the most significant impact.

At a recent meeting of the Chemical Institute of Canada, Neil Martin, vice president of Celanese Canada's chemicals and industrial products group, explained why. One big factor in methanol's favor, Martin says, is availability. Canadian methanol capacity is about to take a quantum leap. Alberta Gas Chemical already has doubled its methanol capacity at Medicine Hat, Alta., from 360,000 metric tons to 720,000 metric tons annually. And, in addition to the Celanese world-scale unit soon to be on stream in Edmonton, Ocelot Industries will be coming in with its 360,000 metric-ton-per-year unit at Kitimat, B.C. When all of these units are operating, Canada's methanol capacity will jump from 410,000 metric tons (last year) to 1.8 million metric tons (next year).

Conventional methanol demand in Canada won't even come close to keeping pace. Formaldehyde accounts for about 40% of methanol consumption and the formaldehyde outlook isn't particularly encouraging. The country's stagnant economy, a slumping construction industry, and even weak exports of building boards are taking their toll among formaldehyde producers.

Martin estimates that next year Canadian methanol demand will be 274,000 metric tons, only modestly higher than what it was last year. That will leave more than 1.5 million metric tons of Canadian surplus methanol available for export—or for the alternate fuel market in Canada itself.

Martin equates that amount of surplus methanol to about 5% of the Canadian gasoline pool. But he emphasizes that by 1983 there will be enough Canadian methanol available in the form of a low-percentage blend in gasoline to satisfy all of Canada's fuel requirements.

A low-percentage blend is the strategy that Celanese Canada has chosen to push. The company is working primarily with a 4.75% blend of methanol with gasoline for a variety of reasons. Not only will enough methanol be available to support the low-percentage blend approach as early as next year, but Canadians will be able to use the blend without any modification to their car engines.

Methanol in low-percentage blends, Martin says, can use Canada's existing gasoline distribution network. A 4.75% blend in gasoline with an equal amount of cosolvent already is approved in the U.S. by the Environmental Protection Agency, and Martin says that tests to confirm EPA findings now are under way in Canada. Martin points out that in the U.S. the 4.75% blend with cosolvent is covered by automobile warranties. He expects that a similar situation would develop in Canada, too.

Celanese studies indicate that the economics are right today for a Canadian refiner to use methanol as an octane booster. These economics will improve in the future, he predicts.

Obviously, Celanese Canada intends to use the experience developed in the U.S. and in several western European countries as a major selling point for its low-percentage blend approach in Canada. But to confirm that existing data also apply to Canada, with its lower ambient temperatures, the company is coordinating a demonstration program to show that 4.75% methanol with cosolvent is acceptable under Canadian driving conditions. The program, which includes fleet tests in Montreal and Toronto plus laboratory and dyna-

### Why methanol may succeed as gasoline octane booster

Celanese Canada thinks that a low-percentage (4.75%) blend of methanol can play a big role as a gasoline octane modifier in Canada. Here's why:

**Supply:** Enough to satisfy national requirements by 1983

**Distribution:** Can use existing gasoline distribution network

**Acceptance:** 4.75% blend with cosolvent is approved by U.S. EPA. Confirmatory fleet tests are under way in Canada

**Auto compatibility:** Does not require vehicle modification; covered by automobile warranties in U.S.

**Timing:** Can start in 1983

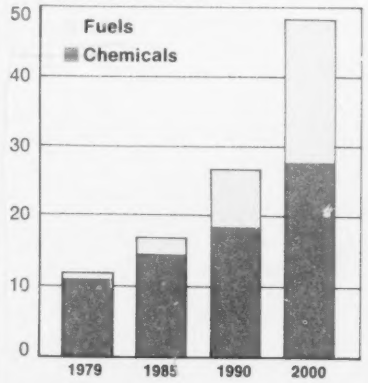
**Market:** All cars can use it

**Economics:** Methanol blends are economically viable today and will become more attractive in the future

**Environmental impact:** Methanol is an extremely clean-burning fuel. Supported by EPA in the U.S. and by Environment Canada

### Fuels hold big market potential for methanol

Global methanol demand, millions of metric tons




Source: Celanese Canada

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**Canada's methanol capacity to increase**

| Thousands of metric tons | 1981 | 1983 |
|---|---|---|
| **Alberta Gas Chemical** | | |
| Medicine Hat, Alta. | 360 | 720 |
| **Celanese Canada** | | |
| Cornwall, Ont. | 50 | 50 |
| Edmonton, Alta. | — | 700 |
| **Ocelot Industries** | | |
| Kitimat, B.C. | — | 360 |
| **TOTAL** | **410** | **1830** |
| **Conventional Canadian demand** | 250 | 275 |
| **Surplus for export** | 160 | 1555 |

Source: Celanese Canada

mometer tests, is under way and will operate for about one year.

Celanese is confident that this program will confirm that a low-percentage methanol blend is compatible with an unmodified car. It also is confident that it can win the refinery economics battle as well.

Methanol, Martin says, will have to compete with several other octane-improving alternatives available to a refiner, such as tetraethyllead, higher-severity reforming, or toluene addition. Tetraethyllead is the refiner's least expensive source of octane, but leaded gasoline is under environmental review in Canada. If Canada's relatively high lead levels in gasoline are phased down, refiners will have to increase the pool octane of their base stock.

This, Martin notes, is an important aspect of methanol's valuation as an octane booster. The reason: Many Canadian refineries, especially in eastern Canada, already are tight on octane-producing capability. "Methanol could be a cheap, viable alternative for these refineries," he says. And low-percentage methanol blends won't need a government subsidy to make them attractive.

But methanol won't capture the Canadian alternate-fuel market uncontested. J. Judd Buchanan, president of CNG Fuel Systems Ltd., says that his company was formed a year and a half ago to wean Canada's vehicles from gasoline to compressed natural gas. And Ontario has a Drive Propane program in progress to promote propane as a transportation fuel. In both these approaches, supply certainly is no problem, and the distribution network is in place. Both, however, require modifying the car. A low-percentage methanol blend doesn't, and Celanese is hoping that this is its ace in the hole.

*Earl Anderson, New York*

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# Facts & Figures

## for the chemical industry

A year ago, the U.S. chemical industry appeared ready to shift into high gear. Output had labored upward to regain just about all the ground lost during the recession of 1980, and industry executives generally were confident that it soon would be climbing to new highs. Optimistic forecasts were widespread. The recession, though painful, also seemed to be happily brief.

Prospects were still clouded, to be sure. Demand remained weak in many key markets for chemicals, such as automobiles, home building, and appliances, as continuing high interest rates dampened consumer purchases. Export markets, too, were soft, reflecting a worldwide economic slump and the rising cost of U.S.-made products.

Nevertheless, at mid-1981 the consensus was that the year as a whole would shape up markedly better than 1980 and that 1982 would bring some further growth.

As it turned out, however, from midyear on it has been all down hill. The data spread across the following pages of Facts & Figures, C&EN's annual statistical review of the chemical industry, clearly show that 1981 proved to be little, if any, better than 1980. Moreover, as the 1982 edition of Facts & Figures goes to press, it is still by no means clear when the current business slump will bottom out.

Facts & Figures contains data gathered together from a broad assortment of sources, including government agencies, trade associations, international organizations, and the companies themselves that make up the multifaceted chemical industry. These data have been treated by the C&EN staff, in many cases, to develop analytical measures and comparisons in order to add perspective to the recent performance of the chemical industry.

## Facts & Figures at a glance

### Section One: Production

**After a relatively strong first half, production of chemicals declined markedly during the last six months of 1981. For the year as a whole, as a result, output was little if any higher than in the previous lackluster year. Plastics were up, although only to about the level of 1979. But for basic chemicals, it was a standoff year, with inorganic chemicals particularly weak.** **Page 32**

### Section Two: Finance

**Although total U.S. shipments of chemicals and allied products climbed 9% last year, the increase stems from higher prices (up 11% overall) rather than an increase in the physical volume of demand. And as output slumped during the second half of 1981, so did profits. The result was erosion of the industry's profitability for the second year in a row. Stagnant demand is putting a crimp in chemical companies' capital spending plans, as well. But it has not dimmed their enthusiasm for research, with R&D support rising sharply in the past three years.** **Page 39**

### Section Three: Performance

**The 1% increase in productivity eked out by chemical companies last year is a slight improvement but well below average gains during the past decade.** **Page 61**

### Section Four: Employment

**Employment in the chemical industry overall essentially was unchanged last year from the year before. But it has been declining since last summer and now is below the lowest level reached during the 1980 recession.** **Page 65**

### Section Five: Foreign Trade

**World trade in chemicals declined in 1981 in dollar volume, but U.S. exports of chemicals increased, giving the U.S. a bigger share of the worldwide market. The increase in U.S. exports was a slim 2%, however, far below the gains chalked up during the previous two years. Meanwhile, imports climbed almost 10%, pushing down the chemical trade surplus for the first time since 1972.** **Page 67**

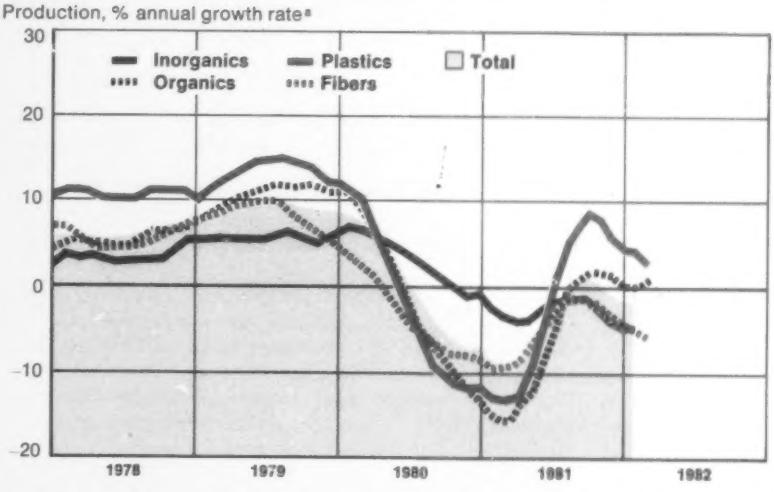
### Section Six: Foreign chemical industries

**Chemical industries throughout the world were in the doldrums last year. In Western Europe, output was down in the U.K. and Italy, but up slightly in West Germany, France, and elsewhere. Earnings, however, remained depressed just about everywhere. In Eastern Europe, growth rates slowed despite relatively modest targets. Japan's industry remained beset by high raw material costs. And Canadian producers, despite a favorable raw materials position, saw profits squeezed by slumping demand and weak prices.** **Page 69**

# 1 Production by the U.S. Chemical Industry

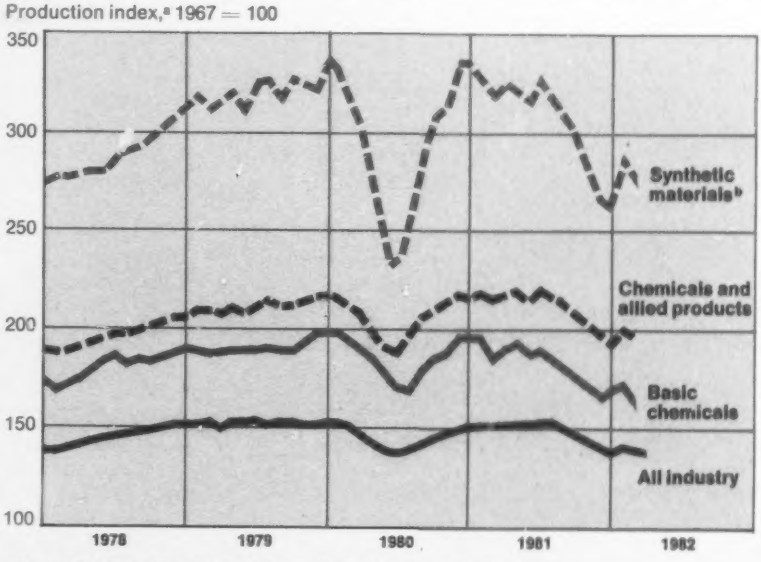
## Output down for many big-volume chemicals

### Recovery in chemical production petered out in late 1981




a Average running annual growth rates in production of major plastics, inorganic and organic chemicals, and all chemicals, and in shipments of man-made fibers. **Sources:** International Trade Commission, Bureau of the Census, Society of the Plastics Industry, Textile Economics Bureau

### For the second time in two years, chemical output slumps




a Seasonally adjusted. b Includes plastics, synthetic rubber, and man-made fibers.
**Source:** Federal Reserve Board

Producers of chemicals in the U.S. were turning out about the same volume of product at the start of 1981 as they had been 12 months earlier, having recovered fully from the sharp but short recession of 1980. Production was maintained on a high plateau throughout the first half of 1981. But as the summer waned, the business climate turned markedly chillier. Output, as a consequence, has been dwindling steadily and now is off close to 20% for both basic chemicals and synthetic materials (plastics, man-made fibers, and synthetic rubber) from a year and a half ago.

Because of the relatively good first six months, production of chemicals eked out a small gain last year, compared to that of recession-wracked 1980. But it failed to match 1979's total. Whatever strength the industry showed, moreover, was focused largely on plastics and, to a lesser extent, man-made fibers. And in many major product areas, the slump during the second half dragged output for the year as a whole below the disappointing level of the year before.

The weakest performance was among inorganic chemicals, with production off 5 to 6% overall, as softening demand for fertilizer materials during the second half of the year compounded the continuing decline for alkalies and chlorine. Production of chlorine and caustic soda slid 8% on the heels of a similar decline the year before. Sulfuric acid likewise was off 8%, phosphoric acid 9%, ammonium nitrate 4%, and ammonia 3%, reflecting the worsening fertilizer market.

Plastics regained much of the ground lost the year before, with polyolefins chalking up the best results among the large-volume polymers, although the picture there, too, was turning increasingly dismal during the final months of 1981. Fibers also made a modest recovery.

Increased production of plastics and fibers put a little luster on organics, but in general for them it was a standoff year. On a product-by-product basis, output was down as often as not, and some of the declines were quite sharp.

## TOP 50 CHEMICALS: Production was lower in 1981 for the second year straight

| Rank 1981 | Rank 1980[a] | | Production: Billions of lb 1981 | Production: Billions of lb 1980 | Production: Common units[b] 1981 | Production: Common units[b] 1980 | Average annual change 1980–81 | 1979–80 | 1976–81 | 1971–81 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | Sulfuric acid | 81.35 | 88.54 | 40,674 tt | 44,272 tt | −8.1% | 5.4% | 3.1% | 3.4% |
| 2 | 2 | Ammonia | 38.07 | 38.09 | 19,037 tt | 19,044 tt | −0.1 | 5.1 | 2.6 | 2.7 |
| 3 | 5 | Nitrogen | 37.31 | 34.71 | 485 bcf | 479 bcf | 1.3 | 16.0 | 11.0 | 11.2 |
| 4 | 4 | Lime[c] | 35.99 | 35.36 | 17,969 tt | 17,680 tt | 1.6 | −8.8 | −1.2 | −0.4 |
| 5 | 3 | Oxygen | 34.93 | 35.68 | 422 bcf | 431 bcf | −2.1 | 0.9 | 1.7 | 2.9 |
| 6 | 6 | Ethylene | 28.87 | 28.67 | 28,867 mp | 28,667 mp | 0.7 | −4.1 | 5.6 | 4.6 |
| 7 | 7 | Sodium hydroxide | 21.30 | 23.25 | 10,649 tt | 11,625 tt | −8.4 | −6.2 | 0.3 | 1.0 |
| 8 | 8 | Chlorine | 21.12 | 22.84 | 10,559 tt | 11,421 tt | −7.5 | −5.7 | 0.3 | 1.2 |
| 9 | 9 | Phosphoric acid | 19.83 | 21.88 | 9,914 tt | 10,938 tt | −9.3 | 7.9 | 4.5 | 5.2 |
| 10 | 11 | Nitric acid | 18.08 | 17.47 | 9,040 tt | 8,733 tt | 3.5 | 2.0 | 3.0 | 1.7 |
| 11 | 10 | Ammonium nitrate[d] | 17.58 | 18.25 | 8,791 tt | 9,127 tt | −3.7 | 17.0 | 4.1 | 2.8 |
| 12 | 12 | Sodium carbonate[e] | 16.56 | 16.55 | 8,281 tt | 8,275 tt | 0.1 | 0.3 | 1.8 | 1.5 |
| 13 | 14 | Urea[f] | 14.97 | 12.96 | 14,970 mp | 12,960 mp | 15.5 | −8.7 | 8.9 | 8.1 |
| 14 | 13 | Propylene | 14.02 | 13.68 | 14,016 mp | 13,676 mp | 2.5 | −3.7 | 7.5 | 7.4 |
| 15 | 19 | Toluene[g] | 10.32 | 7.37 | 1,424 mg | 1,017 mg | 40.0 | −38.0 | 4.6 | 5.0 |
| 16 | 15 | Benzene | 9.91 | 11.60 | 1,348 mg | 1,585 mg | −15.0 | 20.0 | −1.4 | 2.3 |
| 17 | 16 | Ethylene dichloride | 9.17 | 11.11 | 9,171 mp | 11,108 mp | −17.4 | −5.9 | 3.0 | 2.0 |
| 18 | 20 | Methanol | 8.41 | 7.15 | 8,408 mp | 7,153 mp | 17.8 | −2.9 | 6.1 | 5.5 |
| 19 | 18 | Carbon dioxide[h] | 7.96 | 7.44 | 3,982 tt | 3,720 tt | 7.0 | 5.3 | 14.1 | 11.5 |
| 20 | 17 | Ethylbenzene | 7.85 | 7.64 | 7,847 mp | 7,642 mp | 2.7 | −10.0 | 5.1 | 4.7 |
| 21 | 23 | Vinyl chloride | 6.72 | 6.47 | 6,720 mp | 6,466 mp | 3.9 | 1.2 | 3.2 | 4.5 |
| 22 | 21 | Styrene | 6.61 | 6.86 | 6,612 mp | 6,856 mp | −3.6 | −8.4 | 1.0 | 3.5 |
| 23 | 22 | Xylene | 6.43 | 6.59 | 887 mg | 909 mg | −2.5 | −4.3 | −2.6 | 3.8 |
| 24 | 24 | Terephthalic acid[i] | 6.35 | 6.05 | 6,350 mp | 6,054 mp | 4.9 | −1.7 | 4.7 | 10.6 |
| 25 | 26 | Formaldehyde[j] | 5.86 | 5.56 | 5,855 mp | 5,555 mp | 5.4 | −6.9 | 0.8 | 2.6 |
| 26 | 27 | Ethylene oxide | 5.11 | 5.22 | 5,109 mp | 5,220 mp | −2.1 | −7.9 | 2.1 | 3.6 |
| 27 | 25 | Hydrochloric acid | 4.89 | 5.79 | 2,443 tt | 2,895 tt | −15.6 | −2.2 | −0.6 | 1.5 |
| 28 | 29 | Ammonium sulfate | 4.22 | 4.27 | 2,111 tt | 2,136 tt | −1.2 | 8.4 | 0.5 | 1.5 |
| 29 | 28 | Ethylene glycol | 4.06 | 4.39 | 4,055 mp | 4,386 mp | −7.5 | −7.3 | 3.8 | 2.8 |
| 30 | 30 | *p*-Xylene | 3.70 | 4.24 | 3,696 mp | 4,238 mp | −12.8 | −8.9 | 2.9 | 8.3 |
| 31 | 31 | Cumene | 3.31 | 3.46 | 3,306 mp | 3,459 mp | −4.4 | −11.7 | 4.2 | 4.4 |
| 32 | 33 | Butadiene[k] | 3.05 | 2.80 | 3,046 mp | 2,799 mp | 8.8 | −21.9 | −2.9 | −0.7 |
| 33 | 36 | Carbon black | 2.73 | 2.55 | 2,730 mp | 2,546 mp | 7.2 | −24.0 | −2.0 | −1.0 |
| 34 | 32 | Acetic acid | 2.71 | 2.98 | 2,706 mp | 2,977 mp | −9.1 | −8.8 | 2.2 | 3.3 |
| 35 | 35 | Phenol[l] | 2.55 | 2.57 | 2,551 mp | 2,568 mp | −0.7 | −13.9 | 3.1 | 3.9 |
| 36 | 34 | Aluminum sulfate | 2.41 | 2.57 | 1,206 tt | 1,286 tt | −6.2 | 4.4 | 0.3 | 0.7 |
| 37 | 37 | Sodium sulfate[m] | 2.33 | 2.28 | 1,164 tt | 1,139 tt | 2.2 | −2.9 | −1.1 | −1.5 |
| 38 | 38 | Acetone | 2.17 | 2.08 | 2,167 mp | 2,076 mp | 4.4 | −21.7 | 2.3 | 3.5 |
| 39 | 42 | Acrylonitrile | 2.01 | 1.83 | 2,006 mp | 1,830 mp | 9.6 | −9.3 | 5.8 | 7.4 |
| 40 | 40 | Vinyl acetate | 1.93 | 1.92 | 1,934 mp | 1,922 mp | 0.6 | −3.0 | 5.5 | 7.6 |
| 41 | 44 | Calcium chloride[n] | 1.83 | 1.62 | 917 tt | 811 tt | 13.1 | −17.3 | 0.5 | −2.8 |
| 42 | 43 | Propylene oxide | 1.81 | 1.77 | 1,810 mp | 1,767 mp | 2.4 | −21.4 | 0.8 | 4.3 |
| 43 | 39 | Cyclohexane | 1.75 | 1.96 | 1,749 mp | 1,964 mp | −10.9 | −19.0 | −4.3 | 0.1 |
| 44 | 41 | Isopropyl alcohol | 1.64 | 1.84 | 1,644 mp | 1,836 mp | −10.5 | −3.4 | −0.9 | −0.4 |
| 45 | 46 | Titanium dioxide | 1.50 | 1.57 | 750 tt | 787 tt | −4.7 | 6.2 | 1.0 | 1.0 |
| 46 | 47 | Sodium silicate | 1.48 | 1.57 | 738 tt | 785 tt | −6.0 | 1.0 | −0.3 | 1.5 |
| 47 | 45 | Sodium tripolyphosphate | 1.37 | 1.58 | 687 tt | 789 tt | −12.9 | 4.4 | −1.1 | −4.0 |
| 48 | 48 | Acetic anhydride | 1.25 | 1.47 | 1,248 mp | 1,468 mp | −15.0 | −2.5 | −3.7 | −1.9 |
| 49 | 50 | Adipic acid | 1.21 | 1.20 | 1,210 mp | 1,200 mp | 0.8 | −33.3 | −4.4 | −0.8 |
| 50 | 49 | Ethanol[l] | 1.16 | 1.45 | 1,157 mp | 1,451 mp | −20.3 | 3.1 | −0.4 | −3.4 |
| | | **TOTAL ORGANICS IN TOP 50** | **174.91** | **172.89** | | | **1.2%** | **−6.9%** | **3.8%** | **4.5%** |
| | | **TOTAL INORGANICS IN TOP 50** | **372.84** | **383.86** | | | **−2.9%** | **2.5%** | **2.8%** | **2.8%** |
| | | **GRAND TOTAL OF TOP 50** | **547.75** | **556.75** | | | **−1.6%** | **−0.6%** | **1.6%** | **3.4%** |

a Revised. b tt = thousands of tons, bcf = billions of cubic feet, mp = millions of pounds, mg = millions of gallons. c Except refractory dolomite. d Original solution. e Synthetic and natural. f Primary solution. g All grades. h All forms. i Includes both acid and ester without double counting. j 37% by weight. k Rubber grade. l Synthetic only. m High and low purity. n Solid and liquid.
**Sources:** Bureau of the Census, Bureau of Mines, International Trade Commission, C&EN estimates

## PRODUCTION: Generally up last year, but often not to levels of 1979

| Industrial production indexes, 1967 = 100 | 1981 | 1980 | 1979 | 1978 | 1977 | 1976 | 1975 | 1974 | 1973 | 1972 | 1971 | Annual change 1980–81 | Annual change 1971–81 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Total index** | 151.0 | 147.0 | 152.5 | 146.1 | 138.2 | 130.5 | 117.8 | 129.3 | 129.8 | 119.7 | 109.6 | 3% | 3% |
| **Manufacturing, total** | 150.4 | 146.7 | 153.6 | 146.8 | 138.4 | 130.3 | 116.3 | 129.4 | 129.8 | 118.9 | 108.2 | 3 | 3 |
| **Nondurable manufacturing** | 164.8 | 161.2 | 164.0 | 156.9 | 150.5 | 141.8 | 126.4 | 134.6 | 133.8 | 126.5 | 116.6 | 2 | 4 |
| **Chemicals and products** | 215.6 | 207.1 | 211.8 | 197.4 | 185.7 | 170.9 | 147.2 | 159.4 | 154.5 | 143.6 | 125.9 | 4 | 6 |
| **Chemicals and synthetic materials** | 228.6 | 222.2 | 234.2 | 216.7 | 201.1 | 185.1 | 154.1 | 176.7 | 171.9 | 156.4 | 135.8 | 3 | 5 |
| **Basic chemicals** | 186.8 | 187.4 | 192.0 | 181.9 | 171.8 | 161.8 | 135.9 | 153.3 | 147.7 | 137.7 | 123.7 | 0 | 4 |
| Alkalies and chlorine | 114.7 | 121.4 | 132.3 | 119.7 | 119.2 | 119.0 | 106.5 | 125.6 | 123.8 | 120.2 | 114.4 | −6 | 0 |
| Gases, coal tar, inorganic pigments | 181.5 | 184.3 | 197.7 | 186.0 | 174.3 | 164.4 | 133.3 | 165.0 | 157.8 | 146.5 | 125.6 | −2 | 4 |
| Basic organic chemicals | 236.7 | 231.6 | 233.3 | 221.2 | 204.7 | 189.8 | 155.3 | 177.9 | 170.0 | 155.3 | 139.7 | 2 | 5 |
| Inorganic chemicals, nec | 125.5 | 132.4 | 134.9 | 129.3 | 128.5 | 124.3 | 112.9 | 112.6 | 110.8 | 107.8 | 99.2 | −5 | 2 |
| Acids and fertilizer materials | 137.2 | 145.9 | 142.0 | 133.6 | 124.2 | 117.6 | 108.4 | 116.6 | 113.1 | 111.5 | 105.3 | −6 | 3 |
| **Synthetic materials** | 313.7 | 293.3 | 320.1 | 287.6 | 260.8 | 232.5 | 191.0 | 224.4 | 221.1 | 194.7 | 160.4 | 7 | 7 |
| Plastics materials | 429.3 | 386.5 | 420.1 | 366.5 | 320.3 | 280.1 | 213.1 | 258.5 | 243.3 | 217.4 | 166.2 | 11 | 10 |
| Synthetic rubber | 103.3 | 103.2 | 130.5 | 127.5 | 124.5 | 118.7 | 101.2 | 129.7 | 135.6 | 126.9 | 117.2 | 0 | −1 |
| Man-made fibers | 254.4 | 250.3 | 270.8 | 250.9 | 236.8 | 214.3 | 191.2 | 214.4 | 220.1 | 189.1 | 164.9 | 2 | 4 |
| **Chemical products** | 203.0 | 192.4 | 190.2 | 179.0 | 170.9 | 157.2 | 140.7 | 142.8 | 137.7 | 131.3 | 116.4 | 6 | 6 |
| Drugs and medicines | 267.1 | 245.7 | 238.2 | 220.6 | 213.9 | 191.5 | 174.1 | 179.6 | 170.1 | 155.5 | 135.1 | 9 | 7 |
| Soap and toiletries | 177.0 | 170.8 | 171.6 | 163.8 | 155.0 | 143.0 | 127.7 | 128.1 | 129.0 | 130.3 | 114.1 | 4 | 4 |
| Paints | 127.4 | 130.5 | 137.8 | 132.6 | 125.8 | 122.8 | 114.2 | 119.2 | 114.7 | 118.0 | 111.1 | −2 | 1 |
| Agricultural chemicals | 241.4 | 230.5 | 221.6 | 211.8 | 201.1 | 185.4 | 163.9 | 144.6 | 127.0 | 108.9 | 103.5 | 5 | 9 |
| **Petroleum products** | 129.7 | 132.9 | 143.9 | 145.2 | 142.6 | 133.5 | 124.1 | 124.7 | 128.5 | 122.1 | 116.7 | −2 | 1 |
| **Rubber and plastics products** | 274.0 | 255.7 | 272.2 | 253.6 | 232.3 | 199.7 | 166.7 | 195.2 | 184.1 | 172.4 | 147.6 | 7 | 6 |

nec = not elsewhere classified. **Source:** Federal Reserve Board

## MINERALS: Output of fertilizer raw materials declined in 1981

| Thousands of tons | 1981 | 1980 | 1979 | 1978 | 1977 | 1976 | 1975 | 1974 | 1973 | 1972 | 1971 | Annual change 1980–81 | Annual change 1971–81 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Bromine,** sold or used[a] | 189[b] | 189 | 249 | 223 | 217 | 230 | 204 | 216 | 209 | 193 | 178 | 0% | 1% |
| **Calcium chloride,** production[c,d] | 917 | 811 | 981 | 1,031 | 968 | 897 | 828 | 1,101 | 858 | 914[e] | 952[e] | 13 | 0 |
| **Iodine,** consumption[f,g] | 4.3[b] | 4.4 | 4.4 | 4.0 | 4.3 | 3.6 | 3.1 | 3.8 | 3.5 | 3.4 | 3.3 | −2 | 3 |
| Imports[g] | 3.0 | 3.1 | 3.1 | 3.4 | 3.5 | 3.2 | 2.7 | 4.0 | 3.1 | 3.1 | 3.6 | −3 | −2 |
| **Lime,** sold or used[h] | 18,701[b] | 19,037 | 20,983 | 20,484 | 19,987 | 20,257 | 19,159 | 21,645 | 21,132 | 20,332 | 19,635 | −2 | 0 |
| **Lithium,** consumption[f,i] | 3.2[b] | 3.0 | 3.2 | 3.4 | 4.1 | 2.8 | 2.9 | 3.8 | 3.2 | 2.7 | 2.6 | 7 | 2 |
| **Phosphate rock** | | | | | | | | | | | | | |
| Marketable production | 59,110 | 59,982 | 56,891 | 55,156 | 52,091 | 49,231 | 48,806 | 45,676 | 42,128 | 40,823 | 38,878 | −1 | 4 |
| Exports | 11,459 | 15,737 | 15,827 | 14,187 | 14,584 | 10,398 | 12,270 | 13,895 | 13,873 | 14,272 | 12,584 | −27 | −1 |
| **Potash** ($K_2O$ equivalent)[j] | | | | | | | | | | | | | |
| Production | 2,377 | 2,468 | 2,453 | 2,484 | 2,457 | 2,400 | 2,501 | 2,552 | 2,604 | 2,659 | 2,587 | −4 | −1 |
| Imports[k] | 5,287 | 5,481 | 5,693 | 5,189 | 5,076 | 4,594 | 3,797 | 4,325 | 3,587 | 2,961 | 2,766 | −4 | 7 |
| Apparent consumption | 6,850 | 6,999 | 7,626 | 6,840 | 6,605 | 6,149 | 5,113 | 6,086 | 5,563 | 4,816 | 4,815 | −2 | 4 |
| **Salt,** total sold or used[l] | 38,914 | 40,396 | 45,820 | 42,896 | 43,439 | 44,218 | 41,057 | 46,565 | 43,939 | 45,051 | 44,106 | −4 | −1 |
| Evaporated | 6,208 | 6,358 | 6,248 | 5,872 | 5,704 | 5,634 | 5,372 | 5,951 | 5,913 | 5,879 | 5,956 | −3 | 0 |
| Rock | 11,871 | 11,806 | 14,891 | 14,688 | 14,958 | 15,668 | 14,283 | 14,835 | 12,347 | 14,434 | 13,700 | 1 | −1 |
| Salt in brine[m] | 20,835 | 22,231 | 24,681 | 22,336 | 22,777 | 22,917 | 21,401 | 25,779 | 25,680 | 24,737 | 24,449 | −6 | −2 |
| **Sodium carbonate,** production[d] | 8,281 | 8,275 | 8,253 | 8,290 | 8,040 | 7,560 | 7,130 | 7,566 | 7,535 | 7,523 | 7,163 | 0 | 1 |
| **Sulfur,** production[n] | 13,388 | 13,080 | 13,339 | 12,318 | 11,824 | 11,992 | 12,610 | 12,789 | 12,231 | 11,444 | 10,730 | 2 | 2 |
| Apparent consumption[o] | 14,093 | 15,056 | 15,145 | 13,889 | 12,850 | 12,060 | 11,875 | 12,115 | 11,463 | 11,036 | 10,274 | −6 | 3 |
| Frasch, production | 6,997 | 7,044 | 7,007 | 6,226 | 6,520 | 7,016 | 8,077 | 8,849 | 8,518 | 8,165 | 7,868 | −1 | −1 |
| Recovered elemental, production | 4,695 | 4,490 | 4,486 | 4,478 | 3,995 | 3,514 | 3,326 | 2,948 | 2,706 | 2,184 | 1,787 | 5 | 10 |
| Other, production | 1,695 | 1,547 | 1,845 | 1,615 | 1,310 | 1,462 | 1,208 | 992 | 1,008 | 1,096 | 975 | 10 | 6 |

a Elemental bromine sold as such or used in preparation of bromine compounds by primary producers. b Preliminary figure. c 75% $CaCl_2$ equivalent. d Natural and synthetic. e C&EN estimate. f Estimated apparent consumption. g Crude elemental iodine. h Includes Puerto Rican production. i Lithium content basis. j Includes muriate and sulfate of potash, potassium magnesium sulfate, and parent salts; excludes other chemical compounds containing potassium. k Includes nitrate of potash. l Total obtained by all recovery methods that was sold or used by domestic producers (figures differ slightly from U.S. production figures); figures include Puerto Rican production. m Sold or used as such. n Sulfur content basis. o Calculated from shipments plus imports minus exports (sulfur content basis). **Source:** Bureau of Mines

## ORGANIC CHEMICALS: Output fell in 1981 more often than it rose

| Millions of lb unless otherwise noted | Production | | | | | | | | | | | Annual change | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1981[a] | 1980 | 1979 | 1978 | 1977 | 1976 | 1975 | 1974 | 1973 | 1972 | 1971 | 1980–81 | 1971–81 |
| **Acetic acid,** synthetic | 2,706 | 2,977 | 3,265 | 2,776 | 2,570 | 2,463 | 2,197 | 2,584 | 2,429 | 2,235 | 1,956 | −9% | 3% |
| **Acetone** | 2,167 | 2,076 | 2,653 | 2,519 | 2,219 | 1,869 | 1,640 | 1,980 | 1,989 | 1,818 | 1,538 | 4 | 3 |
| **Acrylonitrile** | 2,006 | 1,830 | 2,018 | 1,752 | 1,646 | 1,518 | 1,215 | 1,412 | 1,354 | 1,115 | 979 | 10 | 7 |
| **Aniline** | 635 | 659 | 690 | 606 | 584 | 544 | 407 | 551 | 458 | 410 | 366 | −4 | 6 |
| **Benzene, mg**[b,c] | 1,348 | 1,585 | 1,673 | 1,488 | 1,457 | 1,425 | 1,024 | 1,488 | 1,453 | 1,252 | 1,076 | −15 | 2 |
| **Bisphenol A** | 510 | 530 | 576 | 471 | 455 | 449 | 293 | 370 | 320 | 255 | 187 | −4 | 11 |
| **1,3-Butadiene**[d] | 3,046 | 2,799 | 3,583 | 3,515 | 3,259 | 3,507 | 2,597 | 3,682 | 3,644 | 3,527 | 3,340 | 9 | −1 |
| **Butanol** | 823 | 790 | 766 | 756 | 660 | 625 | 490 | 558 | 519 | 590 | 466 | 4 | 6 |
| **Caprolactam** | 926 | 905[e] | 945 | 919 | 867 | 780 | 713 | 668 | 656 | 640 | 575 | 2 | 5 |
| **Carbon disulfide** | na | 377 | 448 | 476 | 505 | 508 | 479 | 782 | 777 | 768 | 753 | na | na |
| **Carbon tetrachloride** | 717 | 710 | 714 | 737 | 809 | 857 | 906 | 1,163 | 1,047 | 997 | 1,009 | 1 | −3 |
| **Cumene** | 3,306 | 3,459 | 3,917 | 3,380 | 2,644 | 2,716 | 2,003 | 2,906 | 2,665 | 2,293 | 2,144 | −4 | 4 |
| **Cyclohexane** | 1,749 | 1,964 | 2,425 | 2,332 | 2,265 | 2,187 | 1,734 | 2,352 | 2,123 | 2,298 | 1,748 | −11 | 0 |
| **Diisodecyl phthalate** | 134 | 122 | 175 | 171 | 161 | 143 | 106 | 147 | 171 | 153 | 136 | 10 | 0 |
| **Dodecylbenzene**[f] | 513 | 563[e] | 627 | 526 | 526 | 529 | 495 | 533 | 498 | 524 | 550 | −9 | −1 |
| **Ethanol,** synthetic | 1,157 | 1,451 | 1,408 | 1,267 | 1,339 | 1,496 | 1,429 | 1,618 | 1,962 | 1,851 | 1,630 | −20 | −3 |
| **Ethanolamines**[g] | 408 | 376 | 420 | 362 | 308 | 286 | 258 | 307 | 293 | 284 | 259 | 9 | 5 |
| **Ethyl chloride** | 314 | 396 | 582 | 540 | 612 | 669 | 575 | 662 | 660 | 576 | 620 | −21 | −7 |
| **Ethylbenzene** | 7,847 | 7,642 | 8,448 | 8,385 | 8,312 | 5,770 | 4,822 | 6,048 | 5,688 | 5,676 | 4,984 | 3 | 5 |
| **Ethylene** | 28,867 | 28,667 | 29,904 | 25,955 | 25,172 | 22,475 | 20,499 | 23,891 | 22,329 | 20,852 | 18,450 | 1 | 5 |
| **Ethylene dichloride** | 9,171 | 11,108 | 11,794 | 11,001 | 10,997 | 8,042 | 7,977 | 9,165[h] | 9,293[h] | 7,809 | 7,558 | −17 | 2 |
| **Ethylene glycol** | 4,055 | 4,386 | 4,729 | 3,904 | 3,675 | 3,335 | 3,809 | 3,341 | 3,278 | 3,761 | 3,070 | −8 | 3 |
| **Ethylene oxide** | 5,109 | 5,220 | 5,665 | 5,012 | 4,364 | 4,184 | 4,467 | 4,200[i] | 4,167 | 3,962 | 3,598 | −2 | 4 |
| **2-Ethylhexanol** | 389 | 367 | 318 | 420 | 493 | 450 | 387 | 395 | 402 | 526 | 287 | 6 | 3 |
| **Formaldehyde, 37%**[j] | 5,855 | 5,555 | 5,971 | 6,381 | 6,046 | 5,449 | 4,558 | 5,764 | 6,424 | 5,652 | 4,522 | 5 | 3 |
| **Isopropyl alcohol** | 1,644 | 1,836 | 1,900 | 1,730 | 1,888 | 1,936 | 1,521 | 1,939 | 1,835 | 1,790 | 1,674 | −10 | 0 |
| **Maleic anhydride** | 304 | 304 | 323 | 341 | 294 | 264 | 216 | 290 | 282 | 274 | 229 | 0 | 3 |
| **Methanol,** synthetic | 8,408 | 7,153 | 7,367 | 6,443 | 6,453 | 6,242 | 5,176 | 6,878 | 7,064 | 6,472 | 4,950 | 18 | 5 |
| **Methyl chloride** | 362 | 362 | 463 | 454 | 476 | 378 | 366 | 493[h] | 544[h] | 454 | 437 | 0 | −2 |
| **Methyl ethyl ketone** | 626 | 587 | 656 | 661 | 512 | 428 | 425 | 506 | 541 | 509 | 484 | 7 | 3 |
| **Methyl chloroform** | 604 | 692 | 716 | 644 | 635 | 631 | 459 | 592 | 548 | 441 | 375 | −13 | 5 |
| **Methylene chloride** | 559 | 564 | 633 | 570 | 478 | 538 | 497 | 609 | 520 | 471 | 401 | −1 | 3 |
| **Perchloroethylene** | 698 | 765 | 773 | 725 | 614 | 669 | 679 | 734 | 706 | 734 | 705 | −9 | 0 |
| **Phenol,** synthetic[k] | 2,551 | 2,568 | 2,981 | 2,682 | 2,338 | 2,121 | 1,746 | 2,298 | 2,241 | 2,052 | 1,744 | −1 | 4 |
| **Phthalic anhydride** | 811 | 818 | 1,013 | 978 | 926 | 902 | 702 | 977 | 1,023 | 933 | 794 | −1 | 0 |
| **Propylene**[c] | 14,016 | 13,676[l] | 14,198[l] | 13,014[l] | 13,328[l] | 10,030[l] | 8,709[l] | 10,475[m] | 9,884[m] | 8,472[m] | 6,891[m] | 2 | 7 |
| **Propylene glycol** | 480 | 488 | 610 | 547 | 489 | 517 | 391 | 510 | 502 | 563 | 421 | −2 | 1 |
| **Propylene oxide** | na | 1,767 | 2,249 | 2,047 | 1,866 | 1,823 | 1,524 | 1,756 | 1,753 | 1,520 | 1,194 | na | na |
| **Styrene,** monomer | 6,612 | 6,856 | 7,484 | 7,186 | 6,867 | 6,301 | 4,673 | 5,956 | 5,975 | 5,941 | 4,682 | −4 | 4 |
| **Terephthalic acid, dimethyl ester**[n] | 6,350 | 6,054 | 6,159 | 5,954 | 5,410 | 5,051 | 4,614 | 4,262 | 2,564[o] | 4,405[p] | 3,574 | 5 | 6 |
| **Toluene, mg**[b,c] | na | 1,017 | 1,010 | 1,054 | 1,018 | 999 | 705 | 922 | 958 | 916 | 876 | na | na |
| **Vinyl acetate** | 1,934 | 1,922 | 1,982 | 1,692 | 1,586 | 1,481 | 1,290 | 1,403 | 1,503 | 1,211 | 931 | 1 | 8 |
| **Vinyl chloride** | 6,720 | 6,466 | 6,389 | 6,941 | 5,986 | 5,677 | 4,196 | 5,621 | 5,351 | 5,089 | 4,336 | 4 | 4 |
| ***o*-Xylene** | 947 | 995 | 1,082 | 1,013 | 985 | 854 | 703 | 1,056 | 1,068 | 832 | 785 | −5 | 2 |
| ***p*-Xylene** | 3,696 | 4,238 | 4,650 | 3,516 | 3,172 | 2,911 | 2,484 | 2,707 | 2,326 | 2,208 | 1,662 | −13 | 8 |

a Preliminary. b Tar distillers not included; includes material for use in blending motor fuels. c All grades. d Rubber grade. e Preliminary figure; final figure not available. f Includes straight-chain dodecylbenzene, tridecylbenzene, and other straight-chain alkylbenzenes. g Mono-, di-, and triethanolamines. h Production figure may be too low, because some methyl chloride and ethylene dichloride was produced but not separated or measured accurately by some producers. i Approximate. j By weight. k Does not include data for coke ovens and gas retort ovens. l Includes refinery propylene. m Includes data for propane-propylene mixture. n Includes both acid and dimethyl ester (DMT), without double counting. o Includes only dimethyl ester. p Figure may be too high because of possible double counting of some acid and ester. na = not available. **Source:** International Trade Commission.

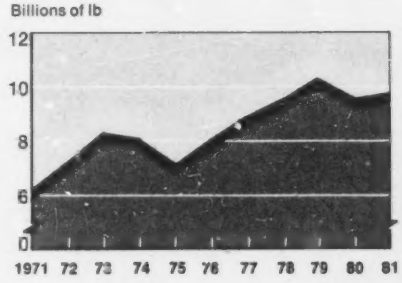
## INORGANICS: Output in 1981 dropped almost across the board

| Thousands of tons unless otherwise noted | Production | | | | | | | | | | | Annual change | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1981[a] | 1980 | 1979 | 1978 | 1977 | 1976 | 1975 | 1974 | 1973 | 1972 | 1971 | 1980–81 | 1971–81 |
| **Aluminum sulfate**[b] | 1,206 | 1,286 | 1,315 | 1,309 | 1,255 | 1,202 | 1,146 | 1,257 | 1,233 | 1,193 | 1,127 | −6% | 1% |
| **Ammonia,**[c,d] 100% | 19,038 | 19,654 | 18,634 | 17,119 | 17,765 | 16,716 | 16,419 | 15,733 | 15,208 | 15,169 | 14,538 | −3 | 3 |
| **Ammonium nitrate,**[e] 100% | 8,791 | 9,128 | 8,293 | 7,210 | 7,177 | 7,186 | 7,088 | 7,542 | 7,235 | 6,863 | 6,635 | −4 | 3 |
| **Ammonium sulfate,**[d,f] 100% | 2,111 | 2,136 | 2,363 | 2,449 | 2,264 | 2,010 | 2,106 | 2,120 | 1,987 | 1,858 | 1,821 | −1 | 1 |
| **Carbon dioxide**[g] | 3,982 | 3,720 | 3,780 | 3,228 | 2,817 | 2,064 | 1,850 | 1,804 | 1,566 | 1,610 | 1,344 | 7 | 11 |
| **Chlorine gas**[h] | 10,559 | 11,421 | 12,291 | 11,052 | 10,573 | 10,378 | 9,167 | 10,753 | 10,402 | 9,854 | 9,352 | −8 | 1 |
| **Hydrochloric acid,**[i] 100% | 2,443 | 2,895 | 3,090 | 2,793 | 2,668 | 2,542 | 2,009 | 2,470 | 2,534 | 2,360 | 2,099 | −16 | 2 |
| **Hydrogen,**[j,k] bcf, 100% | 102 | 106 | 106 | 90 | 85 | 82 | 74 | 82 | 65 | 59 | 56 | −4 | 6 |
| **Nitric acid,**[l] 100% | 9,039 | 9,230 | 8,916 | 7,934 | 7,987 | 7,791 | 7,527 | 8,120 | 8,398 | 7,981 | 7,638 | −2 | 2 |
| **Nitrogen gas,**[j,m] bcf, 100% | 485 | 479 | 427 | 379 | 328 | 289 | 252 | 243 | 227 | 194 | 168 | 1 | 11 |
| **Oxygen,**[j,m] bcf, 100% | 422 | 431 | 456 | 430 | 392 | 388 | 353 | 390 | 389 | 352 | 319 | −2 | 3 |
| **Phosphoric acid,** 100% $P_2O_5$ | 9,914 | 10,939 | 10,318 | 9,637 | 8,745 | 7,949 | 7,677 | 7,213 | 6,927 | 6,712 | 5,970 | −9 | 5 |
| **Phosphorus**[n] | 424 | 432 | 460 | 441 | 430 | 437 | 450 | 524 | 526 | 541 | 545 | −2 | −2 |
| **Sodium hydroxide,** 100% | 10,649 | 11,625 | 12,759 | 11,309 | 11,000 | 10,516 | 9,635 | 11,189 | 10,734 | 10,216 | 9,667 | −8 | 1 |
| **Sodium phosphate**[o] | 687 | 789 | 840 | 824 | 717 | 724 | 770 | 903 | 967 | 1,033 | 1,040 | −13 | −4 |
| **Sodium silicate**[p] | 737 | 786 | 813 | 829 | 760 | 747 | 724 | 770 | 723 | 661 | 636 | −6 | 1 |
| **Sodium sulfate,**[q] 100% | 1,163 | 1,139 | 1,121 | 1,174 | 1,199 | 1,232 | 1,227 | 1,348 | 1,437 | 1,327 | 1,356 | 2 | −2 |
| **Sulfuric acid,**[r] 100% | 40,675 | 44,273 | 43,204 | 41,314 | 38,337 | 34,878 | 32,360 | 33,936 | 31,949 | 31,183 | 29,035 | −8 | 3 |
| **Titanium dioxide,**[s] 100% | 750 | 727 | 742 | 701 | 687 | 713 | 603 | 787 | 785 | 693 | 678 | 3 | 1 |
| **Urea,** 100% | 7,421 | 7,830 | 7,000 | 6,273 | 5,072 | 4,498 | 3,799 | 3,789 | 3,543 | 3,467 | 3,125 | −5 | 9 |

a Preliminary. b Commercial, 17% $Al_2O_3$; includes municipalities except in 1981. c Synthetic anhydrous. d Excludes by-product ammonia liquor and ammonium sulfate. e Original solution. f Synthetic and noncoke by-product. g Solid, liquid, and gas; excludes quantities produced and consumed in plants making soda ash or urea, and quantities produced and transferred to other plants for further processing. h Includes quantities liquefied for use, storage, or shipment. i Includes anhydrous hydrochloric acid production. j High- and low-purity gas. k Liquid and gas; excludes amounts vented and used as fuel, and amounts produced in petroleum refineries for captive use. l Includes unspecified amounts of nitric acid produced but not withdrawn from the system. m Excludes amounts produced and consumed in making synthetic ammonia or ammonia derivatives. n Elemental, white (yellow), and red. o Tripolyphosphate (100% $Na_5P_3O_{10}$). p Soluble silicate glass (water glass), solid and liquid (anhydrous); excludes amounts produced and consumed in making meta-, ortho-, and sesquisilicates. q Anhydrous, high and low purity, and Glauber's salt. r Gross (new and fortified). s Composite and pure. **Note:** bcf = billions of cubic feet. **Sources:** Department of Commerce, International Trade Commission

## MAN-MADE FIBERS: U.S. output recovered only modestly from 1980's depressed levels

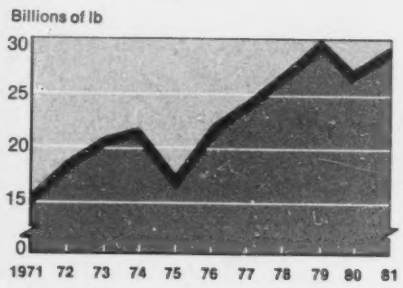
**Man-made fibers production**




| Millions of lb | Production | | | | | | | | | | | Annual change | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1981 | 1980 | 1979 | 1978 | 1977 | 1976 | 1975 | 1974 | 1973 | 1972 | 1971 | 1980–81 | 1971–81 |
| **CELLULOSIC FIBERS** | | | | | | | | | | | | | |
| **Acetate**[a] | 261 | 316 | 324 | 308 | 290 | 298 | 313 | 382 | 462 | 429 | 476 | −17% | −6% |
| **Rayon** | 509 | 490 | 606 | 597 | 598 | 543 | 436 | 817 | 895 | 965 | 915 | 4 | −6 |
| **NONCELLULOSIC FIBERS** | | | | | | | | | | | | | |
| **Acrylic**[b] | 691 | 779 | 761 | 726 | 709 | 621 | 525 | 631 | 742 | 626 | 545 | −11 | 2 |
| **Nylon**[c] | 2332 | 2358 | 2,720 | 2550 | 2326 | 2075 | 1857 | 2124 | 2175 | 1974 | 1595 | −1 | 4 |
| **Olefins**[d] | 785 | 748 | 759 | 692 | 635 | 577 | 497 | 531 | 492 | 416 | 322 | 5 | 9 |
| **Polyester** | 4176 | 3989 | 4,178 | 3800 | 3642 | 3340 | 2995 | 2926 | 2888 | 2328 | 1142[e] | 5 | na |
| **Textile glass** | 1041 | 867 | 1,014 | 923 | 787 | 676 | 546 | 683 | 688 | 572 | 468 | 20 | 8 |
| **Other** | 22[f] | 19[f] | 18[f] | 16[f] | 16[f] | 14[f] | 12[f] | 12[f] | 13[f] | 11[f] | 688[g] | 16 | na |
| **TOTAL** | **9817** | **9566** | **10,381** | **9611** | **9002** | **8144** | **7181** | **8105** | **8354** | **7322** | **6152** | **3%** | **5%** |

a Includes diacetate and triacetate; excludes production for cigarette filtration. b Includes modacrylic. c Includes aramid. d Includes olefin yarn and monofilaments, and olefin and vinyon staple and tow. e Does not include yarn and monofilaments. f Includes only yarn and monofilaments; yarn is chiefly saran and spandex. g Includes only yarn and monofilaments; yarn includes polyester, anidex, saran, spandex, vinyon, and TFE fluorocarbon. **na** = not available. **Source:** Textile Economics Bureau

**Plastics production**




## PLASTICS: Production recovered last year, but remained below 1979 peak

| Millions of lb[a] | Production | | | | | | | | | | | Annual change | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1981 | 1980 | 1979 | 1978 | 1977 | 1976 | 1975 | 1974 | 1973 | 1972 | 1971 | 1980–81 | 1971–81 |
| **THERMOSETTING RESINS** | | | | | | | | | | | | | |
| **Epoxy**[b] | 336 | 315 | 361 | 299 | 261 | 244 | 198 | 249 | 223 | 184 | 165 | 7% | 7% |
| **Polyester**[c] | 997 | 947 | 1,147 | 1,209 | 1,061 | 1,0[illegible] | 834 | 911 | 1,051 | 933 | 730 | 5 | 3 |
| **Urea** | 1,165 | 1,165 | 1,367 | 1,122 | 963 | | 690 | 835 | 867 | 739 | 636 | 0 | 6 |
| **Melamine** | 179 | 167 | 200 | 202 | 200 | 1[illegible]3 | 115 | 164 | 170 | 171 | 168 | 7 | 1 |
| **Phenolic**[d] | 2,333[e] | 1,499 | 1,781 | 1,617 | 1,458 | 1,340 | 1,051 | 1,335 | 1,387 | 1,453 | 1,194 | na | na |
| **TOTAL** | **5,010** | **4,094** | **4,857** | **4,448** | **3,943** | **3,631** | **2,888** | **3,494** | **3,698** | **3,481** | **2,893** | **na** | **na** |
| **THERMOPLASTIC RESINS** | | | | | | | | | | | | | |
| **Polyethylene** | | | | | | | | | | | | | |
| Low density[f] | 7,693 | 7,291 | 7,793 | 7,111 | 6,471 | 5,813 | 4,743 | 5,973 | 5,803 | 5,274 | 4,458 | 6 | 6 |
| High density[g] | 4,695 | 4,405 | 5,010 | 4,201 | 3,652 | 3,125 | 2,468 | 2,837 | 2,637 | 2,325 | 1,924 | 7 | 9 |
| **Polypropylene** | 3,955 | 3,648 | 3,841 | 3,074 | 2,747 | 2,632 | 1,902 | 2,249 | 2,162 | 1,726 | 1,288 | 8 | 12 |
| **Acrylonitrile-butadiene-styrene** | 916 | 920 | 1,191 | 1,134 | 1,069 | 988 | 642 | 857 | 877 | 810 | 686[h] | 0 | 3[i] |
| **Styrene-acrylonitrile** | 107 | 111 | 124 | 120 | 115 | 113 | 109 | 109 | 121 | 99 | 77[h] | −4 | 3[i] |
| **Polystyrene** | 3,621 | 3,521 | 4,005 | 3,823 | 3,446 | 3,195 | 2,662 | 3,364 | 3,322 | 3,139 | 2,553 | 3 | 4 |
| **Styrene-butadiene copolymers and other styrene resins** | 829 | 785 | 916 | 878 | 813 | 756 | 585 | 679 | 703 | 624 | 433 | 6 | 7 |
| **Polyamide,** nylon type | 312 | 274 | 327 | 275 | 254 | 247 | 135 | 204 | 205 | 157 | 110[h] | 14 | 11[i] |
| **Polyvinyl alcohol** | 139 | 141 | 148 | 127 | 119 | 123 | 118 | 142 | 96 | 62 | 58[h] | −1 | 9[i] |
| **Polyvinyl chloride and copolymers** | 5,707 | 5,470 | 6,119 | 5,723 | 5,253 | 4,716 | 3,648 | 4,850 | 4,562 | 4,259 | 3,471 | 4 | 5 |
| **Other vinyl resins**[j] | 208 | 196 | 220 | 197 | 197 | 225 | 187 | 209 | 199 | 194 | 167[h] | 6 | 2[i] |
| **TOTAL** | **28,182** | **26,762** | **29,694** | **26,663** | **24,136** | **21,933** | **17,199** | **21,473** | **20,687** | **18,669** | **15,225** | **5%** | **6%**[i] |

a Dry-weight basis, unless otherwise specified. b Unmodified. c Unsaturated. d Includes other tar acid resins. e Gross weight basis. f 0.940 density and below. g Density above 0.940. h Data from International Trade Commission. i Annual change calculated for 1971–81 is approximate because figures from Society of the Plastics Industry for 1981 and International Trade Commission for 1971 are not completely comparable. j Includes polyvinyl butyral, polyvinyl formal, and polyvinylidene chloride. **na** = not available. **Sources:** Society of the Plastics Industry, International Trade Commission

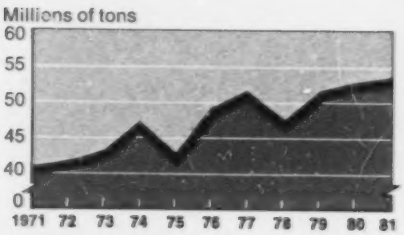
## SYNTHETIC RUBBER: Output remained depressed in 1981 for the second year in a row

| Thousands of metric tons | Production | | | | | | | | | | | Annual change | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1981 | 1980 | 1979 | 1978 | 1977 | 1976 | 1975 | 1974 | 1973 | 1972 | 1971 | 1980–81 | 1971–81 |
| **Styrene-butadiene rubber**[a] | 1032 | 1074 | 1378 | 1395 | 1395 | 1333 | 1179 | 1466 | 1537 | 1500 | 1439 | −4% | −3% |
| **Polybutadiene** | 342 | 311 | 397 | 378 | 361 | 352 | 290 | 310 | 337 | 299 | 258 | 10 | 3 |
| **Nitrile** | 66 | 63 | 75 | 73 | 70 | 73 | 55 | 88 | 84 | 75 | 66 | 5 | 0 |
| **Ethylene-propylene** | 178 | 144 | 175 | 174 | 158 | 130 | 84 | 126 | 120 | 91 | 61 | 24 | 11 |
| **Polychloroprene** | 143 | 151 | 183 | 161 | 165 | 165 | 144 | 163 | na | na | na | −5 | na |
| **Butyl** | | | 194 | 154 | 149 | 125 | 80 | 164 | 160 | 131 | 108 | | |
| **Polyisoprene** | | | | | 62 | 74 | 61 | 93 | 119 | 134 | 118 | −4 | −1[b] |
| **Other**[c] | 261[d] | 272[d] | 132[d] | 138[d] | 56 | 51 | 47 | 88 | 270[e] | 226[e] | 226[e] | | |
| **TOTAL** | **2022** | **2015** | **2534** | **2475** | **2418** | **2304** | **1941** | **2498** | **2627** | **2456** | **2278** | **0%** | **−1%** |

a Excludes high-styrene latex (more than 45% styrene). b Annual change for 1971–81 calculated by comparing polychloroprene plus other (including butyl and polyisoprene) in 1981 with butyl, polyisoprene, and other (including polychloroprene) in 1971. c Excludes polyurethane rubber. d Includes butyl rubber in 1980–81 and polyisoprene in 1978–81. e Includes polychloroprene (neoprene). **na** = not available. **Sources:** Rubber Manufacturers Association, Department of Commerce

# 1 Production by the U.S. Chemical Industry

**Fertilizer consumption**




**Note:** Years ending June 30.
**Source:** Department of Agriculture

## FERTILIZERS: Higher exports help bolster U.S. production . . .

| Thousands of tons | 1981 | 1980 | 1979 | 1978 | 1977 | 1976 | 1975 | 1974 | 1973 | 1972 | 1971 | Annual change 1980–81 | Annual change 1971–81 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **NITROGEN (N)** | | | | | | | | | | | | | |
| Domestic production | 13,036 | 12,323 | 11,106 | 10,466 | 10,789 | 10,572 | 9343 | 10,094 | 9447 | 8971 | 8924 | 6% | 4% |
| Imports | 2,455 | 2,566 | 2,165 | 1,866 | 1,842 | 1,218 | 1198 | 1,068 | 882 | 843 | 929 | −4 | 10 |
| Exports | 3,088 | 2,641 | 2,468 | 1,778 | 1,251 | 1,239 | 1115 | 1,269 | 1508 | 1032 | 1077 | 17 | 11 |
| Domestic supply | 12,403 | 12,248 | 10,803 | 10,554 | 11,380 | 10,551 | 9426 | 9,893 | 8821 | 8782 | 8776 | 1 | 4 |
| **PHOSPHATE ($P_2O_5$)** | | | | | | | | | | | | | |
| Domestic production | 10,471 | 10,012 | 9,432 | 8,245 | 7,793 | 7,199 | 7230 | 6,869 | 6387 | 6150 | 5736 | 5 | 6 |
| Imports | 250 | 239 | 236 | 229 | 245 | 221 | 274 | 315 | 312 | 326 | 283 | 5 | −1 |
| Exports | 4,381 | 3,925 | 3,848 | 3,290 | 2,501 | 2,175 | 1860 | 1,581 | 1422 | 1102 | 898 | 12 | 17 |
| Domestic supply | 6,340 | 6,326 | 5,820 | 5,184 | 5,537 | 5,245 | 5644 | 5,603 | 5277 | 5374 | 5121 | 0 | 2 |
| **POTASH ($K_2O$)** | | | | | | | | | | | | | |
| Domestic production | 2,262 | 2,474 | 2,519 | 2,176 | 2,584 | 2,313 | 2287 | 2,604 | 2690 | 2432 | 2490 | −9 | −1 |
| Imports | 5,487 | 5,403 | 5,085 | 4,948 | 4,955 | 3,910 | 3847 | 4,114 | 3192 | 3088 | 2510 | 2 | 8 |
| Exports | 876 | 1,048 | 993 | 1,003 | 994 | 911 | 848 | 947 | 922 | 657 | 620 | −16 | 4 |
| Domestic supply | 6,873 | 6,829 | 6,605 | 6,121 | 6,545 | 5,312 | 5286 | 5,771 | 4960 | 4863 | 4380 | 1 | 5 |

## . . . as domestic consumption shows little growth

| Thousands of tons | Consumption 1981 | 1980 | 1979 | 1978 | 1977 | 1976 | 1975 | 1974 | 1973 | 1972 | 1971 | Annual change 1980–81 | Annual change 1971–81 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **TYPE** | | | | | | | | | | | | | |
| Mixed fertilizer | 23,340 | 23,270 | 23,742 | 22,110 | 24,099 | 22,958 | 20,647 | 24,067 | 22,547 | 21,511 | 21,513 | 0% | 1% |
| Primary nutrient material | 27,853 | 27,221 | 25,600 | 23,511 | 24,999 | 23,935 | 19,959 | 20,897 | 19,275 | 18,385 | 18,389 | 2 | 4 |
| Secondary and micronutrients | 2,136 | 2,296 | 2,139 | 1,877 | 2,525 | 2,296 | 1,878 | 2,130 | 1,466 | 1,310 | 1,216 | −7 | 6 |
| **TOTAL** | **53,329** | **52,787** | **51,481** | **47,497** | **51,624** | **49,189** | **42,484** | **47,094** | **43,288** | **41,206** | **41,118** | **1%** | **3%** |
| **PRIMARY NUTRIENT CONTENT** | | | | | | | | | | | | | |
| Nitrogen (N) | 11,784 | 11,407 | 10,715 | 9,965 | 10,647 | 10,412 | 8,601 | 9,157 | 8,295 | 8,022 | 8,134 | 3 | 4 |
| Phosphate ($P_2O_5$) | 5,424 | 5,432 | 5,606 | 5,006 | 5,630 | 5,228 | 4,507 | 5,099 | 5,085 | 4,864 | 4,803 | 0 | 1 |
| Potash ($K_2O$) | 6,243 | 6,245 | 6,244 | 5,526 | 5,834 | 5,210 | 4,453 | 5,083 | 4,649 | 4,327 | 4,231 | 0 | 4 |
| **TOTAL** | **23,451** | **23,083** | **22,565** | **20,587** | **22,111** | **20,849** | **17,561** | **19,338** | **18,029** | **17,213** | **17,168** | **2%** | **3%** |

**Note:** Years ending June 30. **Source:** Department of Agriculture

## NITROGEN OUTPUT: Ammonia is top product

| Thousands of tons (N) | 1981 | 1980 | 1979 | 1971 | Change 1980–81 |
|---|---|---|---|---|---|
| Ammonia[a] | 5,455 | 5,270 | 4,603 | 4132 | 4% |
| Ammonium nitrate[b,c] | 1,225 | 1,096 | 1,137 | 1176 | 12 |
| Urea | 1,704 | 1,572 | 1,201 | 562 | 8 |
| Ammonium sulfate[c] | 555 | 521 | 509 | 598 | 7 |
| All other | 4,097 | 3,864 | 3,656 | 2456 | 6 |
| **TOTAL** | **13,036** | **12,323** | **11,106** | **8924** | **6%** |

a Includes aqueous solutions. b Includes ammonium nitrate-limestone mixtures. c Adjusted for estimated quantity going into nonfertilizer uses. **Note:** Years ending June 30. **Source:** Department of Agriculture

## PHOSPHATE OUTPUT: Up 5% last year

| Thousands of tons ($P_2O_5$) | 1981 | 1980 | 1979 | 1971 | Change 1980–81 |
|---|---|---|---|---|---|
| Ammonium phosphate[a] | 6,015 | 5,519 | 5082 | 2277 | 9% |
| Concentrated superphosphate | 1,713 | 1,737 | 1901 | 1462 | −1 |
| Normal and enriched superphosphate | 357 | 384 | 320 | 626 | −7 |
| All other | 2,386 | 2,372 | 2129 | 1371 | 1 |
| **TOTAL** | **10,471** | **10,012** | **9432** | **5736** | **5%** |

a Liquid and solid, excluding that combined with potash salts in process of manufacture.

# Profits remain under pressure despite higher prices, sales

U.S. chemical producers managed to lift their sales a relatively modest 7% last year. That's only about half the annual rate of growth over the past decade.

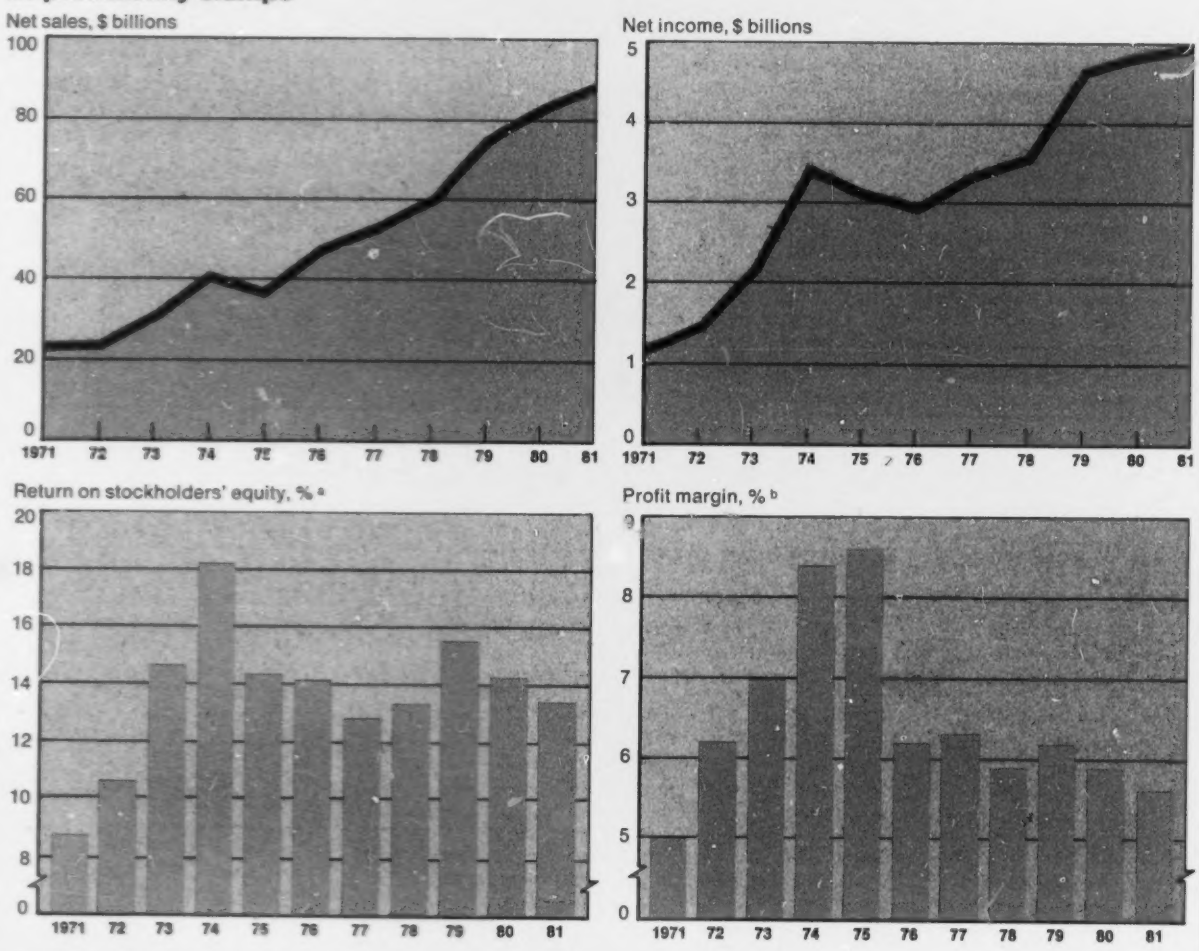
Last year's gain, moreover, stems almost solely from higher selling prices. If producers of industrial chemicals had not been able to hike the price tags on their products an average of 11% during the year, sales growth would have been nonexistent.

Even so, price increases for chemicals during 1981 were considerably smaller than the 23% rise registered during 1980 or the 17% increase of 1979.

Higher prices also helped chemical companies hold profits relatively steady for the second year—during a time when earnings were severely depressed in several other U.S. industries. Chemical companies enjoyed fairly high earnings during the first half of 1981, only to watch them sag sharply during the last few months of the year, as demand dwindled and output was cut back steadily.

Higher prices, too, were insufficient to offset higher operating costs and sliding operating rates. As a result, profitability was eroded further in 1981. Margins on sales, in fact, fell away to the lowest level since the start of the 1970s.

**Chemical firms' earnings have grown little since 1979, despite higher sales, as profitability slumps**




a After-tax earnings as a percentage of stockholders' equity. b After-tax earnings as a percentage of net sales. **Note:** Data based on annual figures of 40 largest industrial chemical companies.

## TOP 100 CHEMICAL PRODUCERS: Their chemical sales total more than $130 billion . . .

| Rank 1981 | Rank 1980[a] | Company | Chemical sales 1981 ($ millions) | Change from 1980 | Chemical sales as % of total sales | Industry classification | Chemical operating profits[b] | Change from 1980 | Chemical operating profits as % of total operating profits | Operating profit margin[c] | Identifiable chemical assets | Chemical assets % of total assets | Operating return on chemical assets[d] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | **Du Pont** | $12,189 | 14.1% | 53.4% | Basic chemicals | $1155 | 15.8% | 40.5% | 9.5% | $8268 | 37.9% | 14.0% |
| 2 | 2 | **Dow Chemical** | 9,387[e] | 7.7 | 79.3 | Basic chemicals | 612 | −37.0 | 66.8 | 6.5 | 8636 | 69.1 | 7.1 |
| 3 | 3 | **Exxon** | 8,449 | 2.7 | 7.5 | Petroleum | 271[f] | −32.6 | 5.0 | 3.2 | 4937 | 7.6 | 5.5 |
| 4 | 4 | **Monsanto** | 6,311[e] | 5.5 | 90.8 | Basic chemicals | 672 | 273.3 | 90.8 | 10.6 | 5224 | 86.1 | 12.9 |
| 5 | 5 | **Union Carbide** | 5,575 | 6.9 | 54.8 | Basic chemicals | 580 | −12.3 | 49.3 | 10.4 | 6008 | 57.6 | 9.7 |
| 6 | 6 | **Celanese** | 3,691 | 15.0 | 98.4 | Basic chemicals | 198 | 21.5 | 90.0 | 5.4 | 2450 | 81.9 | 8.1 |
| 7 | 7 | **Shell Oil** | 3,578 | 12.8 | 16.5 | Petroleum | 15 | −91.4 | 0.4 | 0.4 | 3462 | 18.8 | 0.4 |
| 8 | 8 | **Standard Oil (Ind.)** | 3,088 | 7.6 | 9.7 | Petroleum | 210 | −24.2 | 5.5 | 6.8 | 3792 | 12.3 | 7.6 |
| 9 | 13 | **Atlantic Richfield** | 2,739 | 21.7 | 9.7 | Petroleum | 16 | −88.0 | 0.5 | 0.6 | 2728 | 13.8 | 0.6 |
| 10 | 9 | **W. R. Grace** | 2,666 | −1.1 | 40.9 | Specialty chemicals | 379 | −1.0 | 47.2 | 14.2 | 1721 | 35.9 | 22.0 |
| 11 | 10 | **Allied** | 2,653 | 8.3 | 41.4 | Basic chemicals | 189 | 2.2 | 17.6 | 7.1 | 1810 | 33.9 | 10.4 |
| 12 | 14 | **Phillips Petroleum** | 2,470 | 9.8 | 15.5 | Petroleum | 140 | −13.6 | 5.1 | 5.7 | 1544 | 16.1 | 9.1 |
| 13 | 11 | **Gulf Oil** | 2,412 | −1.1 | 8.0 | Petroleum | −59 | def | def | def | 1701 | 8.3 | def |
| 14 | 12 | **Occidental Petroleum** | 2,406 | −0.8 | 15.7 | Petroleum | 108 | −15.0 | 4.8 | 4.5 | 1922 | 25.9 | 5.6 |
| 15 | 16 | **Eastman Kodak** | 2,349 | 13.5 | 22.7 | Photo equipment | 289 | −8.8 | 14.0 | 12.3 | 1680 | 17.8 | 17.2 |
| 16 | 17 | **Mobil** | 2,325 | 23.0 | 3.4 | Petroleum | 122 | −30.3 | 2.0 | 5.2 | 1797 | 5.2 | 6.8 |
| 17 | 15 | **Hercules** | 2,273 | 8.5 | 83.6 | Basic chemicals | 170 | 28.8 | 94.4 | 7.5 | 1534 | 91.5 | 11.1 |
| 18 | 18 | **American Cyanamid** | 1,945[e] | 4.5 | 53.3 | Basic chemicals | 198 | 10.0 | 56.1 | 10.2 | 1488 | 60.1 | 13.3 |
| 19 | 20 | **Rohm & Haas** | 1,761 | 9.5 | 93.4 | Basic chemicals | 187 | −3.6 | 106.9 | 10.6 | 1109 | 97.9 | 16.9 |
| 20 | 19 | **Stauffer Chemical** | 1,726 | 1.8 | 100.0 | Basic chemicals | 261 | 34.5 | 100.0 | 15.1 | 1638 | 80.5 | 15.9 |
| 21 | 21 | **Tenneco** | 1,589 | −3.1 | 10.3 | Petroleum | 36 | −58.1 | 1.9 | 2.3 | 1244 | 7.4 | 2.9 |
| 22 | 25 | **Texaco** | 1,525 | 13.3 | 2.6 | Petroleum | 143 | 11.7 | 2.3 | 9.4 | 1062 | 3.9 | 13.5 |
| 23 | 23 | **Ethyl Corp.** | 1,515[e] | −0.1 | 86.2 | Basic chemicals | 154 | 0.7 | 85.6 | 10.2 | 958 | 75.9 | 16.1 |
| 24 | 24 | **U.S. Steel** | 1,427 | −0.7 | 10.2 | Steel | 11 | −84.5 | 1.6 | 0.8 | 727 | 5.5 | 1.5 |
| 25 | 22 | **Borden** | 1,424[e] | −8.0 | 32.3 | Dairy products | 141 | −22.5 | 45.8 | 9.9 | 1144 | 49.2 | 12.3 |
| 26 | 33 | **American Hoechst** | 1,391 | 24.1 | 86.5 | Basic chemicals | na | na | na | na | na | na | na |
| 27 | 28 | **FMC** | 1,383 | 13.5 | 41.1 | Machinery | 195 | 72.6 | 62.7 | 14.1 | 1114 | 40.7 | 17.5 |
| 28 | 26 | **Air Products[g]** | 1,362 | 7.9 | 86.8 | Basic chemicals | 204 | 4.6 | 87.2 | 15.0 | 1499 | 79.9 | 13.6 |
| 29 | 32 | **International Minerals[h]** | 1,347 | 17.7 | 48.6 | Agriculture chemicals | 254 | −4.9 | 78.4 | 18.9 | 1384 | 70.1 | 18.4 |
| 30 | 34 | **Ashland Oil** | 1,330 | 20.8 | 13.7 | Petroleum | 41 | −30.5 | 23.0 | 3.1 | 463 | 11.3 | 8.9 |
| 31 | 29 | **Ciba-Geigy** | 1,297 | 9.7 | 69.7 | Specialty chemicals | na | na | na | na | na | na | na |
| 32 | 37 | **Mobay Chemical** | 1,270 | 18.8 | 100.0 | Basic chemicals | na | na | 100.0 | na | 1303 | 100.0 | na |
| 33 | 36 | **Union Oil of Calif.** | 1,248 | 14.8 | 11.0 | Petroleum | 111[f] | 6.7 | 14.0 | 8.9 | 701 | 9.2 | 15.8 |
| 34 | 31 | **Standard Oil of Calif.** | 1,219 | 5.5 | 2.7 | Petroleum | 31[f] | −8.8 | 1.3 | 2.5 | 917 | 3.9 | 3.4 |
| 35 | 35 | **Diamond Shamrock** | 1,152 | 4.9 | 34.1 | Basic chemicals | 150 | 32.7 | 40.7 | 13.0 | 1075 | 35.6 | 14.0 |
| 36 | 41 | **Olin** | 1,077 | 16.6 | 53.8 | Basic chemicals | 80 | 27.0 | 44.2 | 7.4 | 947 | 60.9 | 8.4 |
| 37 | 27 | **CF Industries** | 1,054[e] | −14.5 | 100.0 | Agriculture chemicals | 81 | −66.1 | 100.0 | 7.7 | 1133 | 100.0 | 7.1 |
| 38 | 38 | **B. F. Goodrich** | 1,050 | 2.7 | 33.0 | Rubber products | 48 | −20.0 | 43.6 | 4.6 | 1261 | 46.7 | 3.8 |
| 39 | 39 | **PPG Industries** | 1,012 | 5.0 | 30.2 | Glass products | 120 | −16.7 | 31.9 | 11.9 | 1004 | 34.0 | 15.8 |
| 40 | 30 | **Williams Cos.** | 985[e] | −15.9 | 49.8 | Agriculture chemicals | 35 | −80.1 | 22.9 | 3.6 | 1018 | 41.6 | 3.4 |
| 41 | 40 | **BASF Wyandotte** | 967 | 5.3 | 100.0 | Basic chemicals | 24 | 84.6 | 100.0 | 2.5 | 791 | 100.0 | 3.0 |
| 42 | 43 | **Reichhold Chemicals** | 950 | 7.3 | 100.0 | Basic chemicals | 35 | 29.6 | 100.0 | 3.7 | 401 | 98.0 | 8.7 |
| 43 | 42 | **Lubrizol** | 899 | −2.5 | 100.0 | Specialty chemicals | 149 | −22.0 | 100.0 | 16.6 | 582 | 86.5 | 25.6 |
| 44 | 44 | **National Distillers** | 823 | −1.0 | 40.0 | Alcoholic beverages | 134 | 6.3 | 71.3 | 16.3 | 606 | 36.1 | 22.1 |
| 45 | 45 | **Farmland Industries[i]** | 816 | 11.2 | 14.8 | Agricultural supplies | 67 | −40.7 | 31.2 | 8.2 | 454 | 24.2 | 14.8 |
| 46 | 47 | **Sun Co.** | 746 | 12.9 | 5.0 | Petroleum | na | na | na | na | na | na | na |
| 47 | 47 | **Georgia-Pacific** | 738[e] | 11.6 | 13.6 | Wood products | 149 | −2.6 | 37.6 | 20.2 | 947 | 18.7 | 15.7 |
| 48 | 46 | **Dow Corning** | 722 | 5.9 | 100.0 | Specialty chemicals | 76 | 2.7 | 100.0 | 10.5 | 787 | 100.0 | 9.7 |
| 49 | 54 | **Akzona** | 694 | 20.9 | 58.4 | Basic chemicals | 25 | def | 46.3 | 3.6 | 432 | 51.7 | 5.8 |
| 50 | 52 | **Koppers** | 678[e] | 17.5 | 33.6 | Diversified chemicals | 29 | −38.3 | 20.4 | 4.3 | 377 | 28.4 | 7.7 |

a Revised. b Operating profit defined as sales less administrative expense and cost of selling. c Operating profit as a percentage of chemical sales. d Operating profit as a percentage of identifiable chemical assests. e Chemical sales include significant amounts of nonchemical products. f Chemical net profit. g Fiscal year ended Sept. 30, 1981. h Fiscal year ended June

## . . . and they are split about equally between the chemical industry and other industries

| Rank 1981 | Rank 1980[a] | Company | Chemical sales 1981 ($ millions) | Change from 1980 | Chemical sales as % of total sales | Industry classification | Chemical operating profits[b] | Change from 1980 | Chemical operating profits as % of total operating profits | Operating profit margin[c] | Identifiable chemical assets | Chemical assets % of total assets | Operating return on chemical assets[d] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 51 | 50 | Nalco Chemical | $667 | 8.1% | 100.0% | Specialty chemicals | $122 | 6.1% | 100.0% | 18.3% | $227 | 75.1% | 34.9% |
| 52 | 49 | Borg-Warner | 664 | 5.2 | 24.0 | Auto equipment | 61 | 3.4 | 29.6 | 9.2 | 316 | 22.5 | 19.3 |
| 53 | 53 | Merck | 664[e] | 15.5 | 22.7 | Drugs | 73 | 25.9 | 12.6 | 11.0 | 547 | 16.5 | 13.3 |
| 54 | 51 | Pennwalt | 641 | 7.7 | 60.7 | Basic chemicals | 73 | 43.1 | 60.3 | 11.4 | 436 | 68.3 | 16.7 |
| 55 | 64 | El Paso | 576 | 22.6 | 14.7 | Natural gas | 13 | −61.8 | 3.0 | 2.3 | 425 | 11.5 | 3.1 |
| 56 | 61 | Uniroyal | 573 | 17.4 | 25.4 | Tires | 79 | −23.3 | 50.6 | 13.8 | 415 | 28.5 | 19.0 |
| 57 | 55 | NL Industries | 565 | 2.4 | 22.9 | Petroleum services | 77 | 40.0 | 15.3 | 13.6 | 358 | 15.6 | 21.5 |
| 58 | 65 | Badische | 563 | 24.3 | 100.0 | Basic chemicals | 25 | 13.6 | 100.0 | 4.4 | 410 | 100.0 | 6.1 |
| 59 | 62 | Esmark[k] | 561[e] | 15.4 | 17.9 | Food | 47 | nc | 24.4 | 8.4 | 354 | 20.3 | 13.3 |
| 60 | 56 | Freeport-McMoRan | 554 | 5.1 | 66.3 | Agricultural chemicals | 148 | 9.6 | 62.2 | 26.7 | 313 | 21.1 | 47.3 |
| 61 | 57 | Aluminum Co. of America | 553[e] | 5.7 | 11.0 | Nonferrous metals | na | na | na | na | na | na | na |
| 62 | 59 | Kerr-McGee | 543 | 8.4 | 14.2 | Petroleum | 35 | −5.4 | 7.2 | 6.4 | 685 | 20.1 | 5.1 |
| 63 | 60 | Kaiser Aluminum | 533 | 8.6 | 16.5 | Nonferrous metals | 74 | 39.6 | 26.7 | 13.9 | 481 | 12.5 | 15.4 |
| 64 | 65 | Witco Chemical | 510 | 12.6 | 39.5 | Specialty chemicals | 48 | 37.1 | 43.2 | 9.4 | 239 | 33.0 | 20.1 |
| 65 | 69 | Airco | 500 | 19.0 | 41.7 | Basic chemicals | na | na | na | na | na | na | na |
| 66 | 68 | Cabot[g] | 492 | 11.6 | 30.3 | Specialty metals | 55 | nc | 26.7 | 13.4 | 286 | 22.7 | 23.1 |
| 66 | 58 | Eli Lilly | 492 | −5.0 | 17.7 | Drugs | na | na | na | na | na | na | na |
| 68 | 63 | Standard Oil (Ohio) | 481 | 1.1 | 3.5 | Petroleum | 34 | −39.3 | 0.8 | 7.1 | 525 | 3.3 | 6.5 |
| 69 | 67 | International Flavors | 451 | 0.7 | 100.0 | Specialty chemicals | 102 | −3.8 | 100.0 | 22.6 | 375 | 87.0 | 27.2 |
| 70 | 73 | National Starch | 450 | 25.3 | 67.4 | Specialty chemicals | na | na | na | na | na | na | na |
| 71 | 71 | Beatrice Foods | 446 | 14.7 | 4.9 | Food | 63 | 26.0 | 8.3 | 14.1 | na | na | na |
| 72 | 70 | Pfizer | 421 | 1.2 | 13.0 | Drugs | −4 | def | def | def | 446 | 12.2 | def |
| 73 | 75 | Mississippi Chemical[h] | 395 | 14.8 | 100.0 | Farm cooperative | 61 | 24.5 | 100.0 | 15.4 | 303 | 71.8 | 20.1 |
| 74 | 83 | Polysar | 395 | 45.8 | 100.0 | Basic chemicals | 12 | 100.0 | 100.0 | 3.0 | 180 | 100.0 | 6.7 |
| 75 | 72 | Internorth | 368 | 2.2 | 10.1 | Natural gas | 49 | −29.0 | 11.6 | 13.3 | 407 | 10.7 | 12.0 |
| 76 | 77 | American Petrofina | 335 | 5.7 | 13.4 | Petroleum | 8 | −57.9 | 6.4 | 2.4 | 248 | 21.6 | 3.2 |
| 77 | 78 | Liquid Air | 327 | 4.8 | 80.1 | Basic chemicals | 46 | 4.5 | 90.2 | 14.1 | 378 | 78.1 | 12.2 |
| 78 | 79 | GAF | 325 | 5.5 | 48.3 | Diversified chemicals | 57 | 9.6 | def | 17.5 | 201 | 35.9 | 28.4 |
| 79 | 76 | Upjohn | 324 | −0.6 | 17.1 | Drugs | 4 | −85.7 | 1.5 | 1.2 | 194 | 10.0 | 2.1 |
| 80 | 84 | Terra Chemicals | 317[e] | 19.6 | 100.0 | Agricultural chemicals | na | na | na | na | na | na | na |
| 80 | 81 | Thiokol | 317 | 11.2 | 44.0 | Aerospace | 31 | −3.1 | 50.0 | 9.8 | 291 | 62.2 | 10.7 |
| 82 | 92 | First Mississippi[h] | 308 | 39.4 | 86.0 | Agricultural chemicals | 44 | 25.7 | 73.3 | 14.3 | 163 | 51.1 | 27.0 |
| 83 | 86 | Rhône-Poulenc | 300 | 17.6 | 100.0 | Specialty chemicals | na | na | na | na | na | na | na |
| 84 | 88 | Vulcan Materials | 299 | 19.1 | 38.2 | Nonmetallic minerals | 71 | 42.0 | 52.6 | 23.7 | 236 | 35.0 | 30.1 |
| 85 | 87 | H. B. Fuller[i] | 280 | 11.1 | 85.1 | Specialty chemicals | na | na | na | na | na | na | na |
| 86 | 85 | Martin Marietta | 277 | 7.4 | 13.6 | Aerospace | 48 | −3.1 | 23.1 | 11.8 | 212 | 22.9 | 12.6 |
| 86 | — | Tyler | 277 | na | 35.9 | Diversified chemicals | 26 | na | 32.9 | 9.4 | 163 | 36.1 | 16.0 |
| 88 | 82 | Emhart | 270 | −3.9 | 15.5 | Machinery | 27 | 12.5 | 16.4 | 14.0 | 111 | 10.4 | 24.3 |
| 89 | 94 | Big Three Industries | 265 | 28.6 | 32.2 | Petroleum services | 79 | 27.4 | 39.1 | 29.8 | 505 | 49.8 | 15.6 |
| 90 | 89 | SCM[h] | 263[e] | 6.5 | 12.6 | Paint | 31 | −3.1 | 23.1 | 11.8 | 247 | 22.9 | 12.6 |
| 91 | 90 | Petrolite[k] | 261 | 12.0 | 37.9 | Specialty chemicals | 41 | 5.1 | 89.1 | 15.7 | 158 | 79.8 | 25.9 |
| 92 | 74 | Soltex | 250 | −28.6 | 100.0 | Basic chemicals | na | na | na | na | na | na | na |
| 93 | 92 | Houston Natural Gas[m] | 248 | 21.4 | 1.6 | Natural gas | 14 | −26.3 | 0.6 | 6.9 | 368 | 16.7 | 7.3 |
| 94 | 90 | Cities Service | 240 | 3.0 | 2.8 | Petroleum | 5 | −68.8 | 0.8 | 2.1 | 340 | 5.6 | 1.5 |
| 95 | 96 | Engelhard | 240[e] | 21.8 | 10.9 | Specialty metals | 47 | 30.6 | 44.8 | 19.6 | 203 | 28.8 | 23.2 |
| 96 | 80 | Baker Industries | 235 | −20.3 | 100.0 | Agricultural chemicals | na | na | na | na | na | na | na |
| 97 | 95 | Loctite[h] | 214 | 7.4 | 100.0 | Specialty chemicals | 24 | −33.3 | 100.0 | 11.2 | 195 | 107.7 | 12.3 |
| 98 | 50 | Stepan Chemical | 205 | 29.7 | 100.0 | Specialty chemicals | 13 | 116.7 | 100.0 | 6.3 | 176 | 100.0 | 7.4 |
| 99 | 48 | Getty Oil | 204 | 21.4 | 1.6 | Petroleum | 14 | −26.3 | 0.6 | 6.9 | na | na | na |
| 100 | 49 | Agway | 200 | 21.2 | 9.7 | Farm cooperative | na | na | na | na | na | na | na |

30, 1981. i Net income. j Fiscal year ended Aug. 31, 1981. k Fiscal year ended Oct. 31, 1981. l Fiscal year ended Nov. 30, 1981. m Fiscal year ended July, 1981. na = not available. nc = no change. def = deficit.

# 2 Finances of the U.S. Chemical Industry

## SHIPMENTS: Chemical industry sales grew at a below-average rate last year

| $ Billions | 1981 | 1980 | 1979 | 1978 | 1977 | 1976 | 1975 | 1974 | 1973 | 1972 | 1971 | Annual change 1980–81 | Annual change 1971–81 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **All manufacturing industries** | $1997.8 | $1845.9 | $1727.3 | $1523.4 | $1358.4 | $1185.6 | $1039.1 | $1017.5 | $875.2 | $756.3 | $671.1 | 8% | 12% |
| **Chemicals and allied products** | 182.3 | 167.1 | 153.8 | 129.8 | 118.2 | 104.1 | 89.7 | 83.7 | 65.0 | 57.4 | 50.9 | 9 | 14 |
| Industrial chemicals[a] | 64.0 | 60.0 | 55.1 | 44.8 | 41.5 | 35.6 | 29.4 | 26.6 | 19.0 | 16.6 | 14.9 | 7 | 16 |
| Drugs, soap, and toiletries | 45.9 | 44.9 | 40.6 | 34.7 | 30.6 | 27.8 | 24.3 | 22.2 | 19.3 | 17.8 | 15.9 | 2 | 11 |
| **Petroleum and coal products** | 194.7 | 176.6 | 134.3 | 103.9 | 97.5 | 82.3 | 69.5 | 58.9 | 34.9 | 28.7 | 26.9 | 10 | 22 |
| **Rubber and plastic products, nec** | 46.6 | 48.1 | 48.9 | 43.2 | 39.6 | 31.8 | 27.2 | 27.9 | 24.4 | 20.9 | 17.8 | −3 | 10 |
| **Paper and allied products** | 77.7 | 71.7 | 66.0 | 57.0 | 52.1 | 48.2 | 41.7 | 41.8 | 32.8 | 28.3 | 25.5 | 8 | 12 |

a Excluding pigments. **nec** = not elsewhere classified. **Source:** Department of Commerce

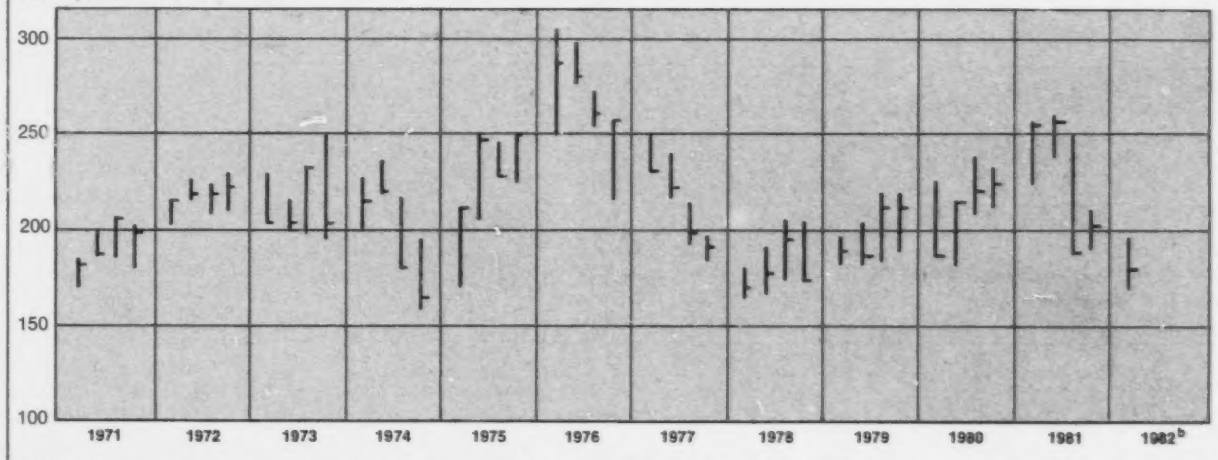
## PRICES: Increases in 1981 were smaller than in 1980

| Producer price indexes,[a] 1967 = 100 | Annual average 1981 | 1980 | 1979 | 1978 | 1977 | 1976 | 1975 | 1974 | 1973 | 1972 | 1971 | Annual change 1980–81 | Annual change 1971–81 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **All commodities** | 293.4 | 268.8 | 235.6 | 209.3 | 194.2 | 183.0 | 174.9 | 160.1 | 134.7 | 119.1 | 114.0 | 9% | 10% |
| **Industrial commodities** | 304.1 | 274.8 | 236.5 | 209.4 | 195.1 | 182.4 | 171.5 | 153.8 | 125.9 | 117.9 | 114.1 | 11 | 10 |
| **Chemicals and allied products** | 287.8 | 260.3 | 222.3 | 198.8 | 192.8 | 187.2 | 181.3 | 146.8 | 110.0 | 104.2 | 104.1 | 11 | 11 |
| Industrial chemicals | 363.8 | 324.0 | 264.0 | 225.6 | 223.9 | 219.3 | 206.9 | 151.7 | 103.4 | 101.2 | 102.0 | 12 | 14 |
| Prepared paint | 249.9 | 235.3 | 204.4 | 192.3 | 182.4 | 174.4 | 166.9 | 145.7 | 122.2 | 118.0 | 115.6 | 6 | 8 |
| Paint materials | 300.2 | 273.9 | 241.2 | 212.7 | 205.9 | 189.8 | 177.2 | 152.3 | 113.2 | 104.1 | 101.5 | 10 | 11 |
| Drugs and pharmaceuticals | 193.4 | 174.5 | 159.4 | 148.1 | 140.5 | 134.0 | 126.6 | 112.7 | 104.3 | 103.0 | 102.4 | 11 | 7 |
| Fats and oils, inedible | 295.6 | 298.0 | 376.7 | 315.8 | 279.0 | 249.9 | 255.2 | 338.2 | 228.3 | 115.8 | 133.6 | −1 | 8 |
| Agricultural chemicals and chemical products | 284.8 | 257.1 | 214.4 | 198.4 | 187.8 | 188.4 | 203.6 | 137.7 | 96.6 | 91.7 | 92.1 | 11 | 12 |
| Plastic resins and materials | 289.2 | 279.2 | 235.9 | 199.8 | 195.7 | 194.0 | 180.9 | 143.8 | 92.1 | 88.7 | 88.7 | 4 | 13 |
| Other chemicals and allied products | 254.4 | 224.5 | 191.8 | 181.8 | 175.7 | 170.7 | 168.6 | 147.5 | 118.1 | 113.5 | 112.0 | 13 | 9 |
| **Rubber and plastic products** | 232.8 | 217.4 | 194.3 | 174.8 | 167.6 | 159.2 | 150.2 | 136.2 | 112.4 | 109.3 | 109.1 | 7 | 8 |

a Formerly called "wholesale price indexes." **Source:** Department of Labor

## Chemical stocks have drifted down in the past year, now at level of 10 years ago

Stock price index, 1954 = 100[a]




a C&EN weighted stock price index of Allied Corp., American Cyanamid, Celanese, Dow Chemical, Du Pont, Monsanto, and Union Carbide; weighted according to number of shares outstanding for each company. b First quarter.

## INDUSTRY BALANCE SHEET: Debt and capital investment rise markedly

### Industrial chemicals and synthetics

| Assets | 1981 ($ billions) | 1980 ($ billions) | Change |
|---|---|---|---|
| **Current assets** | | | |
| Cash and time deposits in U.S. | $ 0.99 | $ 0.6[illegible] | 48 |
| Marketable securities | 1.04 | 0.99 | 5 |
| Receivables | 13.22 | 13.18 | 0 |
| Inventories | 12.79 | 10.83 | 18 |
| Other current assets | 1.96 | 1.92 | 2 |
| **Total** | **30.01** | **27.58** | **9** |
| **Fixed assets:** | | | |
| Plant, property, and equipment | 74.04 | 69.46 | 7 |
| Less: accumulated depreciation and depletion | 32.52 | 32.94 | −1 |
| **Net fixed assets** | **40.52** | **36.52** | **11** |
| **Other assets, including investments and intangibles** | **19.28** | **14.79** | **30** |
| **TOTAL ASSETS** | **$89.81** | **$78.89** | **14%** |

| Liabilities and stockholders' equity | 1981 ($ billions) | 1980 ($ billions) | Change |
|---|---|---|---|
| **Current liabilities:** | | | |
| Accounts payable | $ 6.88 | $ 6.86 | 0% |
| Short-term loans | 1.62 | 2.53 | −36 |
| Accrued income taxes | 0.76 | 1.10 | −31 |
| Current portion of long-term debt | 0.63 | 0.62 | 2 |
| Other current liabilities | 6.73 | 5.10 | 32 |
| **Total** | **16.62** | **16.21** | **3** |
| **Long-term debt** | **23.15** | **16.76** | **38** |
| **Deferred taxes, minority interest, and other noncurrent liabilities** | **6.25** | **6.15** | **2** |
| **TOTAL LIABILITIES** | **$46.03** | **$39.12** | **18%** |
| **Stockholders' equity:** | | | |
| Capital stock and other capital | 16.43 | 11.52 | 43 |
| Retained earnings | 27.35 | 28.25 | −3 |
| **TOTAL STOCKHOLDERS' EQUITY** | **$43.78** | **$39.77** | **10%** |
| **TOTAL LIABILITIES AND STOCKHOLDERS' EQUITY** | **$89.81** | **$78.89** | **14%** |

Source: Federal Trade Commission

## DEBT RATIOS: Up appreciably for chemical companies

| $ Billions | 1981 | 1980 | 1979 | 1978 | 1977 | 1976 | 1975 | 1974 | 1973 | 1972 | 1971 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| INDUSTRIAL CHEMICALS AND SYNTHETICS | | | | | | | | | | | |
| **Long-term debt** | $23.2 | $16.8 | $14.8 | $13.6 | $12.3 | $11.8 | $10.2 | $7.8 | $7.2 | $7.6 | $7.6 |
| **Stockholders' equity** | $43.8 | $39.8 | $32.3 | $29.3 | $26.3 | $25.0 | $22.8 | $20.5 | $18.7 | $18.5 | $17.5 |
| **Debt ratio[a]** | 34.6% | 29.6% | 31.4% | 31.8% | 31.9% | 32.0% | 30.8% | 27.6% | 27.8% | 29.2% | 30.3% |
| CHEMICALS AND ALLIED PRODUCTS | | | | | | | | | | | |
| **Long-term debt** | $36.0 | $28.3 | $24.9 | $23.5 | $21.1 | $19.4 | $16.8 | $12.8 | $10.7 | $11.5 | $10.7 |
| **Stockholders' equity** | $86.8 | $79.5 | $67.4 | $60.8 | $54.9 | $50.8 | $45.7 | $40.9 | $36.7 | $36.1 | $32.8 |
| **Debt ratio[a]** | 29.3% | 26.3% | 27.0% | 27.9% | 27.8% | 27.6% | 26.9% | 23.8% | 22.6% | 24.2% | 24.6% |
| ALL MANUFACTURING | | | | | | | | | | | |
| **Long-term debt** | $265.1 | $236.2 | $204.8 | $182.0 | $167.3 | $153.6 | $145.2 | $130.1 | $112.9 | $118.3 | $111.5 |
| **Stockholders' equity** | $756.4 | $699.7 | $624.0 | $560.8 | $511.7 | $475.3 | $435.5 | $408.4 | $368.0 | $353.1 | $327.1 |
| **Debt ratio[a]** | 26.0% | 25.2% | 24.7% | 24.5% | 24.6% | 24.4% | 25.0% | 24.2% | 23.5% | 25.1% | 25.4% |

a Long-term debt as a percentage of long-term debt plus stockholders' equity. **Note:** Because of changes in accounting rules and industry classifications, numbers over the entire range of years are not strictly comparable. **Source:** Federal Trade Commission

## CASH FLOW: Increased outside financing reflects corporate acquisitions last year

| $ Millions, % of total | 1981 | | 1980 | | 1979 | | 1978 | | 1977 | |
|---|---|---|---|---|---|---|---|---|---|---|
| SOURCES OF FUNDS | | | | | | | | | | |
| **Net income** | $ 4,358 | 18.2% | $ 3,981 | 33.2% | $ 3,801 | 36.3% | $3085 | 33.6% | $2754 | 30.6% |
| **Depreciation and depletion** | 4,267 | 17.9 | 3,818 | 31.8 | 3,602 | 34.4 | 3197 | 34.8 | 2833 | 31.5 |
| **Deferred taxes** | 1,012 | 4.2 | 679 | 5.7 | 427 | 4.1 | 353 | 3.8 | 357 | 4.0 |
| **Other internal sources** | 1,833 | 7.7 | 815 | 6.8 | 1,093 | 10.5 | 930 | 10.1 | 1214 | 13.5 |
| **Long-term debt** | 7,493 | 31.4 | 2,079 | 17.3 | 1,210 | 11.6 | 1545 | 16.8 | 1609 | 17.9 |
| **Stock** | 4,931 | 20.6 | 630 | 5.2 | 322 | 3.1 | 84 | 0.9 | 230 | 2.5 |
| **TOTAL** | **$23,894** | **100.0%** | **$12,002** | **100.0%** | **$10,454** | **100.0%** | **$9194** | **100.0%** | **$8997** | **100.0%** |
| APPLICATION OF FUNDS | | | | | | | | | | |
| **Dividends** | $ 1,845 | 7.7% | $ 1,603 | 13.4% | $ 1,474 | 14.1% | $1317 | 14.3% | $1184 | 13.1% |
| **Capital expenditures** | 8,344 | 34.9 | 7,027 | 58.5 | 5,633 | 53.9 | 5080 | 55.3 | 5488 | 61.0 |
| **Additions to working capital** | 3,759 | 15.7 | 1,057 | 8.8 | 1,075 | 10.3 | 862 | 9.4 | 520 | 5.8 |
| **Reduction of long-term debt** | 1,493 | 6.3 | 1,119 | 9.3 | 1,042 | 10.0 | 879 | 9.5 | 747 | 8.3 |
| **Other applications** | 8,453 | 35.4 | 1,196 | 10.0 | 1,230 | 11.7 | 1054 | 11.5 | 1058 | 11.8 |
| **TOTAL** | **$23,894** | **100.0%** | **$12,002** | **100.0%** | **$10,454** | **100.0%** | **$9194** | **100.0%** | **$8997** | **100.0%** |

**Note:** Data are totals for 15 major chemical companies: Allied, American Cyanamid, Celanese, Diamond Shamrock, Dow Chemical, Du Pont, Ethyl, Hercules, Monsanto, Olin, Pennwalt, Rohm & Haas, Stauffer Chemical, Union Carbide, and Williams Cos. **Source:** Company annual reports

## FINANCIAL ANALYSIS: Profitability fell for both large and smaller firms last year

| | Profit margin[a] | Return on investment[b] | Debt as % of debt plus equity | % total sales abroad[c] | % total assets abroad[d] | Sales per employee[e] | Dividends as % of net income | CAPITAL SPENDING[f] as % of sales | CAPITAL SPENDING[f] as % of net plant | R&D spending as % of sales | Sales as % of assets | Net plant as % of gross plant |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **SALES OVER $1 BILLION** | | | | | | | | | | | | |
| **Air Products[g]** | 8.0% | 4.7% | 29.4% | 21.1% | 24.3% | $ 97 | 18.1% | 20.6% | 24.8% | 2.0% | 83.6% | 61.4% |
| **Akzona** | 1.0 | 0.9 | 43.4 | na | na | 77 | 84.5 | 5.0 | 16.2 | 2.7 | 142.0 | 42.0 |
| **Allied** | 5.4 | 5.0 | 31.1 | 24.4 | 23.9 | 110 | 33.3 | 9.5 | 21.2 | 2.4 | 119.9 | 58.1 |
| **American Cyanamid** | 5.4 | 4.8 | 25.4 | 35.0 | 27.1 | 87 | 40.7 | 5.0 | 13.6 | 4.5 | 119.1 | 52.5 |
| **Celanese** | 3.8 | 3.1 | 39.8 | 22.5 | 20.4 | 105 | 44.4 | 11.0 | 27.3 | 2.8 | 125.4 | 43.3 |
| **Dow Chemical** | 4.8 | 3.6 | 44.8 | 47.9 | 44.8 | 186 | 60.6 | 9.9 | 19.0 | 3.4 | 95.0 | 56.2 |
| **Ethyl** | 5.2 | 5.5 | 19.3 | 24.6 | 15.5 | 121 | 35.0 | 8.0 | 21.3 | 2.1 | 139.2 | 57.8 |
| **FMC** | 5.2 | 5.3 | 23.4 | 34.9 | 15.9 | 87 | 31.6 | 8.1 | 22.7 | 3.1 | 122.9 | 59.4 |
| **B. F. Goodrich** | 2.9 | 2.7 | 37.1 | 19.0 | 12.4 | 95 | 39.5 | 17.8 | 42.4 | 1.7 | 117.8 | 61.3 |
| **W. R. Grace** | 5.5 | 7.2 | 40.0 | 24.2 | 17.1 | 73 | 32.4 | 10.1 | 26.0 | 0.8 | 129.9 | 65.6 |
| **Hercules** | 5.0 | 4.8 | 30.2 | 21.4 | 24.5 | 119 | 39.3 | 6.2 | 18.4 | 2.3 | 136.1 | 45.0 |
| **International Minerals[h]** | 7.7 | 6.1 | 33.3 | 24.4 | 10.6 | 187 | 43.6 | 17.0 | 27.0 | na | 100.5 | 65.7 |
| **Monsanto** | 6.4 | 5.1 | 25.0 | 29.9 | 25.6 | 121 | 32.6 | 9.6 | 21.0 | 3.2 | 114.5 | 51.2 |
| **National Distillers** | 6.7 | 7.7 | 19.8 | na | na | na | 58.5 | 2.2 | 9.1 | na | 119.1 | 53.1 |
| **Olin** | 4.6 | 3.9 | 27.4 | 5.1 | 10.3 | 148 | 29.7 | 9.3 | 22.0 | 1.9 | 123.7 | 49.4 |
| **Pennwalt** | 3.5 | 3.7 | 30.4 | 18.5 | 20.7 | 99 | 63.5 | 5.0 | 17.0 | 2.5 | 136.3 | 53.1 |
| **PPG Industries** | 6.3 | 5.3 | 21.2 | 19.3 | 15.8 | 92 | 36.8 | 11.2 | 21.6 | 3.5 | 113.5 | 59.4 |
| **Rohm & Haas** | 4.9 | 4.7 | 24.9 | 34.0 | 28.1 | 140 | 35.6 | 9.7 | 33.9 | 4.1 | 139.7 | 43.3 |
| **Stauffer Chemical** | 8.7 | 5.8 | 28.9 | 12.7 | 11.9 | 141 | 37.9 | 13.8 | 20.4 | 3.0 | 34.9 | 63.2 |
| **Union Carbide** | 6.4 | 4.7 | 28.5 | 31.4 | 28.7 | 92 | 34.5 | 11.7 | 20.5 | 2.0 | 97.6 | 57.7 |
| **Williams Cos.** | 5.0 | 3.5 | 35.9 | na | na | 282 | 36.1 | 11.8 | 15.6 | na | 80.8 | 70.8 |
| **Witco Chemical** | 3.0 | 4.3 | 33.6 | 13.9 | 14.4 | 156 | 40.9 | 6.4 | 29.5 | na | 178.1 | 56.9 |
| **MEDIAN 1981** | **5.2%** | **4.8%** | **29.8%** | **24.2%** | **20.4%** | **$105** | **37.4%** | **9.7%** | **21.3%** | **2.6%** | **119.1%** | **57.3%** |
| **MEDIAN 1980** | **5.3%** | **5.0%** | **35.6%** | **27.7%** | **24.3%** | **$106** | **35.9%** | **9.7%** | **23.5%** | **2.2%** | **120.6%** | **54.2%** |
| **SALES FROM $112 MILLION TO $1 BILLION** | | | | | | | | | | | | |
| **Chemed** | 10.0 | 15.1 | 0 | 16.9 | 11.0 | na | 90.8 | 2.2 | 7.4 | 0.3 | 108.6 | 64.5 |
| **Crompton & Knowles** | 3.5 | 5.7 | 22.2 | 20.5 | 23.0 | 97 | 40.7 | 2.8 | 20.5 | 1.8 | 169.6 | 57.6 |
| **Essex Chemical** | 4.7 | 6.6 | 48.7 | na | na | 182 | 25.6 | 7.9 | 32.5 | 1.6 | 161.0 | 61.0 |
| **First Mississippi[h]** | 8.3 | 7.8 | 27.7 | na | na | 338 | 16.8 | 16.3 | 49.7 | na | 112.2 | 51.8 |
| **Freeport-McMoRan** | 19.1 | 8.8 | 33.9 | na | na | 161 | 24.5 | 61.9 | 45.1 | na | 56.4 | 71.3 |
| **H. B. Fuller[i]** | 4.1 | 7.9 | 23.4 | 30.9 | 46.3 | 100 | 15.4 | 2.1 | 14.8 | 1.8 | 208.0 | 61.1 |
| **GAF** | def | def | 59.0 | 9.6 | 6.1 | 104 | 0 | 4.1 | 14.1 | 1.2 | 120.1 | 62.7 |
| **Great Lakes Chemical** | 11.7 | 8.5 | 16.4 | 15.0 | na | na | 18.3 | 14.9 | 23.1 | 3.1 | 90.1 | 69.6 |
| **Philip A. Hunt** | 3.4 | 3.7 | 20.9 | 27.7 | 17.0 | 108 | 60.5 | 8.1 | 25.1 | 5.2 | 127.0 | 63.0 |
| **International Flavors** | 14.7 | 13.1 | 0 | 64.9 | 55.6 | 126 | 53.1 | 3.7 | 13.2 | 6.6 | 104.7 | 58.5 |
| **Liquid Air** | 7.4 | 5.2 | 27.7 | 43.8 | 43.8 | na | 56.2 | 14.4 | 21.7 | 1.0 | 88.4 | 62.3 |
| **Loctite[h]** | 4.9 | 5.7 | 0.1 | 44.6 | 52.5 | 83 | 52.9 | 6.2 | 30.8 | 2.7 | 118.0 | 70.9 |
| **Lubrizol** | 10.2 | 11.5 | 5.0 | 56.2 | 44.7 | 212 | 46.8 | 8.4 | 26.5 | 3.7 | 133.6 | 61.9 |
| **Nalco Chemical** | 12.2 | 14.5 | 3.6 | 20.7 | 24.6 | 141 | 49.3 | 8.9 | 33.6 | 4.6 | 143.0 | 53.1 |
| **Petrolite[j]** | 9.4 | 11.0 | 8.0 | 20.2 | 22.0 | na | 32.4 | 5.1 | 23.1 | 2.5 | 150.3 | 50.6 |
| **Reichhold Chemicals** | 1.8 | 3.3 | 29.7 | 14.8 | 18.6 | 170 | 36.8 | 1.7 | 9.2 | 0.7 | 232.5 | 59.5 |
| **Stepan Chemical** | 3.2 | 3.4 | 37.9 | na | na | 227 | 29.2 | 5.9 | 17.8 | 3.2 | 116.1 | 60.8 |
| **Thiokol** | 5.1 | 6.8 | 1.9 | 16.4 | 10.7 | 81 | 32.5 | 5.3 | 22.0 | 1.7 | 154.1 | 58.6 |
| **MEDIAN 1981** | **6.3%** | **6.7%** | **21.6%** | **20.6%** | **23.0%** | **$134** | **34.7%** | **6.1%** | **22.6%** | **2.2%** | **123.6%** | **61.1%** |
| **MEDIAN 1980** | **7.9%** | **7.2%** | **22.7%** | **21.5%** | **22.2%** | **$142** | **33.5%** | **6.2%** | **22.7%** | **2.5%** | **129.5%** | **60.4%** |

**a** Net income as percentage of sales. **b** Net income as percentage of current assets plus gross plant. **c** Consolidated sales only. **d** Foreign identifiable assets as percentage of total assets. **e** Thousands of dollars. **f** Actual spending on construction of new facilities and purchase of new equipment and land in consolidated businesses. **g** For fiscal year ended Sept. 30, 1981. **h** For fiscal year ended June 30, 1981. **i** For fiscal year ended Nov. 30, 1981. **j** For fiscal year ended Oct. 31, 1981. **na** = not available. **def** = deficit. **Note:** Net income is from continuing operations excluding extraordinary and nonrecurring items where possible.

Capital spending in the U.S. chemical industry is completely becalmed and will stay that way at least through 1982. Many basic chemical companies have pruned already modest spending plans for new plant and equipment under the weight of a severe, continuing recession. But even before the recession, chemical capital spending had geared down notably from its frenetic pace in the mid-1970s. This year is the fifth in a row of low capital spending relative to industry sales.

An update of C&EN's annual worldwide capital spending survey of 17 major U.S. basic chemical companies finds a mere 1% increase now planned for 1982 over 1981—to $8.27 billion. Six months ago, the planned increase for 1982 was 6%. With inflation stripped out, the new figure guarantees an actual drop from 1981. Revised data for 1981 now show just a 5% increase over 1980, down from 9% foreseen a year ago.

The government's capital spending surveys for the broader category of chemical and allied products companies find a somewhat more expansive prospect. For U.S. spending, the Commerce Department's regular surveys show a planned increase of 13% in 1982 to $15.38 billion after an 8% gain to $13.60 billion in 1981. For spending by wholly owned foreign affiliates of U.S. chemical firms, Commerce finds a planned increase of 29% in 1982 to $4.0 billion. However, the original increase in foreign spending planned a year ago for 1981 was trimmed to just 3% by the end of the year.

For perspective, the cyclical trough in basic chemical companies' capital spending becomes quite clear by comparison with sales. Spending as a percentage of sales, which has peaked at about 14% in the past decade, is down to a low 9.7% for 1982, C&EN estimates. The figure for 1981 also was low at 10.1%.

The capital spending lull in chemicals has reached the point that unspent project backlogs at year's end eased in 1981 after climbing substantially in 1979 and 1980, according to surveys by the Conference Board. This means an end to the surplus of appropriations over spending which had characterized hopeful industry plans at the turn of the decade.

It wasn't supposed to be quite this quiet on the capital spending front in 1982, although industry forecasts in the past few years have leaned toward restraint. The three-year pause in the industry's basic growth since 1979 simply has thrown off a lot of investment schedules, creating much more unused plant capacity this year than thought earlier. Add to this a decided industry switch toward development of more specialized, less capital-intensive products. The result for 1982 is a near halt to increases in the chemical industry's largest use of funds after paying ordinary operating expenses and taxes.

## CHEMICAL CAPITAL SPENDING: Leading chemical firms hold funding nearly flat in 1982

| $ Millions | 1982[a] | 1981 | 1980 | 1979 | 1978 | 1977 | 1976 | 1975 | 1974 | 1973 | 1972 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Air Products | $ 400 | $ 323 | $ 364 | $ 246 | $ 200 | $ 143 | $ 162 | $ 151 | $ 110 | $ 67 | $ 42 |
| Akzona | 68 | 60 | 64 | 54 | 42 | 35 | 38 | 51 | 57 | 42 | 43 |
| Allied | 700 | 609 | 533 | 409 | 502 | 465 | 352 | 314 | 306 | 194 | 128 |
| American Cyanamid | 185 | 181 | 196 | 235 | 251 | 235 | 232 | 204 | 139 | 83 | 72 |
| Celanese | 400 | 414 | 253 | 245 | 248 | 243 | 223 | 208 | 220 | 159 | 128 |
| Diamond Shamrock | 540 | 521 | 387 | 266 | 319 | 390 | 334 | 183 | 201 | 103 | 61 |
| Dow Chemical | 950 | 1176 | 1184 | 1268 | 1075 | 1163 | 1200 | 935 | 890 | 415 | 359 |
| Du Pont[b] | 1400 | 1420 | 1297 | 864 | 714 | 704 | 876 | 1036 | 1008 | 781 | 561 |
| Ethyl | 120 | 141 | 156 | 123 | 96 | 88 | 88 | 69 | 75 | 35 | 32 |
| W. R. Grace | 700 | 657 | 658 | 514 | 313 | 279 | 234 | 309 | 303 | 174 | 135 |
| Hercules | 200 | 167 | 229 | 186 | 116 | 127 | 150 | 151 | 217 | 144 | 80 |
| Monsanto | 660 | 678 | 781 | 566 | 480 | 607 | 647 | 528 | 313 | 205 | 168 |
| Olin | 160[c] | 186 | 172 | 161 | 163 | 208 | 166 | 99 | 67 | 78 | 76 |
| Pennwalt | 100 | 53 | 53 | 65 | 61 | 45 | 40 | 32 | 43 | 25 | 22 |
| Rohm & Haas | 175 | 182 | 93 | 68 | 66 | 79 | 110 | 106 | 106 | 73 | 62 |
| Stauffer Chemical | 215 | 239 | 246 | 239 | 201 | 193 | 199 | 199 | 83 | 45 | 35 |
| Union Carbide | 1300 | 1186 | 1129 | 831 | 688 | 805 | 965 | 862 | 517 | 289 | 244 |
| TOTAL | $8273 | $8183 | $7795 | $6340 | $5535 | $5809 | $6016 | $5437 | $4655 | $2912 | $2248 |
| ANNUAL CHANGE | 1% | 5% | 23% | 15% | −5% | −3% | 11% | 17% | 60% | 30% | −6% |

a Planned. b Excludes Conoco. c C&EN estimate. **Note:** Figures are for worldwide spending on construction, equipment, and land in consolidated businesses. Where possible, acquisition costs and investments in nonconsolidated businesses are excluded. **Sources:** Company data, C&EN estimates

# 2 Finances of the U.S. Chemical Industry

## INDUSTRY CAPITAL SPENDING: Budgets still increase for chemicals and allied products

| $ Billions | 1982[a] | 1981 | 1980 | 1979 | 1978 | 1977 | 1976 | 1975 | 1974 | 1973 | 1972 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Chemicals** | $ 15.38 | $ 13.60 | $ 12.60 | $10.78 | $ 8.46 | $ 8.14 | $ 8.12 | $ 7.63 | $ 6.48 | $ 4.24 | $ 3.38 |
| **Iron and steel** | 4.07 | 3.17 | 3.29 | 3.09 | 2.52 | 2.79 | 3.04 | 3.03 | 1.94 | 1.25 | 1.06 |
| **Nonferrous metals** | 2.95 | 3.46 | 3.11 | 2.39 | 2.11 | 1.88 | 1.97 | 2.18 | 2.04 | 1.30 | 0.97 |
| **Paper** | 6.75 | 6.72 | 6.80 | 5.55 | 3.99 | 3.59 | 3.11 | 2.98 | 2.90 | 2.00 | 1.45 |
| **Petroleum** | 28.96 | 26.56 | 20.69 | 16.21 | 13.95 | 12.70 | 10.76 | 9.59 | 7.31 | 4.68 | 4.80 |
| **Rubber** | 2.03 | 1.77 | 1.73 | 2.17 | 2.10 | 1.66 | 1.32 | 1.15 | 1.56 | 1.55 | 1.03 |
| **Stone, clay, glass** | 3.18 | 3.14 | 3.82 | 3.94 | 3.10 | 2.23 | 1.88 | 1.67 | 1.64 | 1.58 | 1.33 |
| **All manufacturing** | 136.81 | 126.79 | 115.81 | 98.68 | 79.72 | 69.22 | 59.95 | 54.92 | 53.21 | 42.37 | 35.42 |

a Estimate. **Source:** Department of Commerce

## Backlogs of unspent chemical capital funds receded in 1981

| $ Billions | 1981 | 1980 | 1979 | 1978 | 1977 | 1976 | 1975 | 1974 | 1973 | 1972 | 1971 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Chemicals** | $ 9.5 | $ 9.8 | $ 8.5 | $ 7.2 | $ 7.4 | $ 7.1 | $ 6.9 | $ 6.6 | $ 4.9 | $ 2.9 | $ 2.3 |
| **Iron and steel** | 5.5 | 3.9 | 4.5 | 4.0 | 3.6 | 4.7 | 5.4 | 5.8 | 2.4 | 1.9 | 1.8 |
| **Nonferrous metals** | 3.3 | 3.7 | 2.9 | 2.7 | 2.9 | 2.4 | 2.2 | 2.7 | 2.2 | 1.1 | 0.7 |
| **Paper** | 4.7 | 4.0 | 4.2 | 3.2 | 2.6 | 2.0 | 2.7 | 2.9 | 1.7 | 1.1 | 0.8 |
| **Petroleum, coal** | 29.7 | 26.7 | 16.1 | 14.6 | 15.0 | 12.2 | 14.1 | 12.8 | 7.1 | 4.3 | 3.8 |
| **Rubber** | 1.0 | 1.0 | 0.9 | 0.9 | 0.8 | 0.7 | 0.6 | 0.7 | 0.9 | 0.8 | 0.5 |
| **Stone, clay, glass** | 2.1 | 2.0 | 2.3 | 2.4 | 2.0 | 1.5 | 1.4 | 1.7 | 1.5 | 0.8 | 0.5 |
| **All manufacturing** | 92.0 | 91.9 | 76.7 | 63.4 | 56.5 | 47.5 | 46.4 | 49.8 | 37.1 | 23.3 | 18.9 |

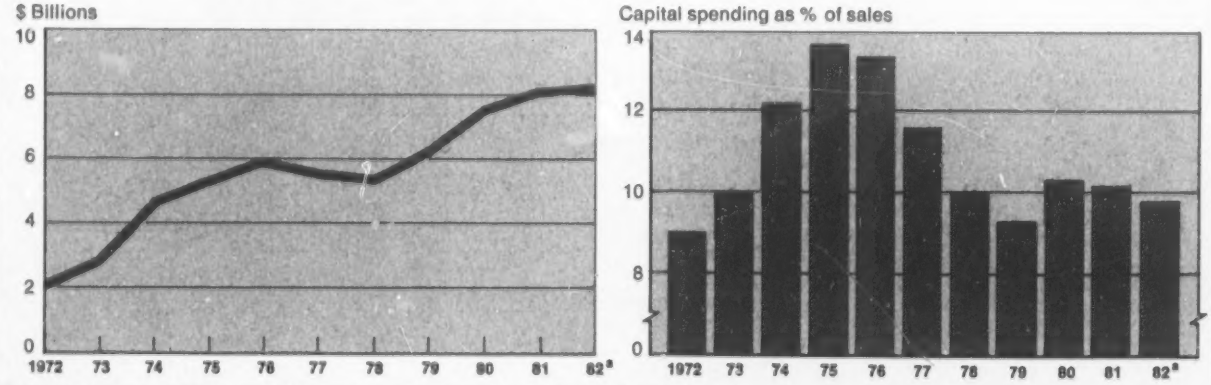
**Note:** Figures are for fourth quarter each year. **Source:** Conference Board

## Chemical capital spending continues to increase outside U.S.

| $ Billions[a] | 1982[b] | 1981 | 1980 | 1979 | 1978 | 1977 | 1976 | 1975 | 1974 | 1973 | 1972 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Chemicals and allied products** | $ 4.0 | $ 3.1 | $ 3.0 | $ 2.6 | $ 1.9 | $ 2.0 | $ 2.7 | $ 2.5 | $ 2.1 | $1.4 | $1.2 |
| **Metals, primary and fabricated** | 1.5 | 1.0 | 0.9 | 0.6 | 0.6 | 0.5 | 0.7 | 0.7 | 0.7 | 0.8 | 0.6 |
| **All manufacturing** | 21.4 | 19.5 | 19.5 | 15.4 | 12.0 | 10.5 | 10.9 | 11.3 | 11.6 | 9.2 | 7.2 |
| **Petroleum** | 20.5 | 17.5 | 14.8 | 11.0 | 9.5 | 8.9 | 7.9 | 8.9 | 7.8 | 6.4 | 5.2 |

a By majority-owned affiliates of U.S. companies; data after 1973 are not consistent with earlier years. b Planned. **Source:** Department of Commerce

### Chemical capital spending hits plateau, falls again relative to sales




a Planned. **Sources:** Worldwide data for 17 large U.S. basic chemical companies, C&EN estimates

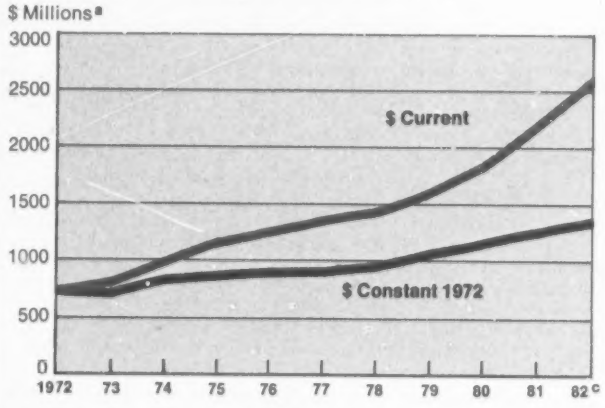
In ever more marked contrast to the weak state of capital spending, research and development support in the U.S. chemical industry is booming. In an astonishing show of support for a deep recession year, the 15 major U.S. basic chemical companies in C&EN's regular survey plan to push R&D spending up 18% over 1981. This follows increases of 20% in 1981, 17% in 1980, and 12% in 1979. That means that these companies' R&D outlays have mushroomed 84% in just four years to an expected $2.6 billion in 1982.

This is truly one of the golden periods for R&D, which is enjoying enormous corporate support. Underneath, companies have decided that they must move quickly to develop sophisticated, largely specialized products for the 1980s. Reasons are that big growth has ended for the bulk chemicals and polymers developed in the 1950s and 1960s, patent protection is ending for many specialties, and foreign competition has increased greatly.

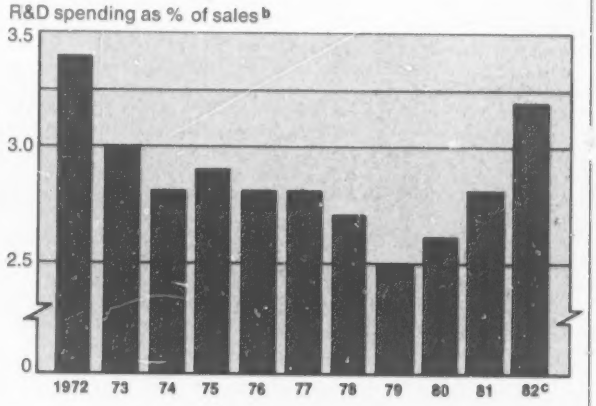
The R&D spending increases in the four most recent years comfortably outstrip inflation in R&D costs and hence allow real increases in staffs and projects. R&D employment has expanded steadily and promises to stay strong. For 1982, companies forecast an increase in R&D funds that is more than twice the 8% inflation rate estimated by Battelle Columbus Laboratories for costs of doing R&D.

Chemical R&D funds also are fast regaining their old position relative to industry sales. R&D spending had fallen from 3.4% of sales in 1972 to a low of 2.5% in 1979. Since then, however, the figure has recovered most of the ground and could reach 3.2% of sales this year, C&EN estimates.

**R&D funding by chemical companies continues to outpace inflation . . .**




**. . . and easily will rise again relative to company sales**




a R&D spending by basic chemical companies. b By basic chemical companies. c Estimate. **Sources:** Worldwide data for 15 U.S. basic chemical companies, Battelle Columbus Laboratories, C&EN estimates

## CHEMICAL R&D SPENDING: More strong increases are budgeted in 1982

| $ Millions | 1982[a] | 1981 | 1980 | 1979 | 1978 | 1977 | 1976 | 1975 | 1974 | 1973 | 1972 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Air Products | $ 35 | $ 32 | $ 30 | $ 24 | $ 23 | $ 24 | $ 19 | $ 16 | $ 11 | $ 8 | $ 7 |
| Akzona | 36 | 32 | 28 | 25 | 23 | 20 | 18 | 17 | 16 | 13 | 11 |
| Allied | 198 | 152 | 105 | 70 | 56 | 51 | 40 | 35 | 31 | 29 | 29 |
| American Cyanamid | 180 | 164 | 142 | 124 | 108 | 96 | 83 | 73 | 64 | 52 | 44 |
| Celanese | 118 | 104 | 94 | 92 | 83 | 77 | 70 | 64 | 58 | 49 | 52 |
| Diamond Shamrock | 64 | 53 | 45 | 37 | 32 | 26 | 24 | 20 | 14 | 12 | 12 |
| Dow Chemical | 500 | 404 | 314 | 269 | 232 | 203 | 188 | 167 | 149 | 118 | 105 |
| Du Pont[b] | 670 | 575 | 485 | 415 | 377 | 367 | 353 | 336 | 344 | 286 | 265 |
| W. R. Grace | 65 | 55 | 45 | 42 | 37 | 32 | 28 | 30 | 32 | 28 | 22 |
| Hercules | 66 | 61 | 53 | 47 | 40 | 37 | 35 | 30 | 30 | 25 | 24 |
| Monsanto[c] | 260 | 221 | 204 | 161 | 136 | 132 | 114 | 116 | 87 | 82 | 92 |
| Pennwalt | 34 | 27 | 24 | 22 | 23 | 21 | 19 | 16 | 14 | 13 | 18 |
| Rohm & Haas | 90 | 77 | 67 | 54 | 49 | 45 | 43 | 45 | 39 | 32 | 25 |
| Stauffer Chemical | 60 | 51 | 44 | 37 | 34 | 33 | 29 | 24 | 20 | 17 | 14 |
| Union Carbide | 222 | 201 | 166 | 161 | 156 | 156 | 143 | 120 | 94 | 77 | 70 |
| TOTAL | $2598 | $2209 | $1846 | $1580 | $1409 | $1320 | $1206 | $1109 | $1003 | $841 | $790 |
| ANNUAL CHANGE | 18% | 20% | 17% | 12% | 7% | 9% | 9% | 11% | 19% | 6% | 2% |

a Planned. b Excludes Conoco. c R&D definition narrowed after 1972. **Sources:** Company data, C&EN estimates

# 2 Finances of the U.S. Chemical Industry

Chemical companies clearly were keeping a close watch on operating expenses last year. As a result, for a year when many segments of U.S. industry were awash with red ink, profit-and-loss statements in the chemical industry looked comparatively favorable, by and large.

In fact, more than twice as many of the major chemical companies listed on this and the following pages—which present financial results for 48 leading chemical and pharmaceutical firms covering the past four years—were able to report higher earnings during 1981 than watched earnings decline. The comparison, to be sure, is against a year, 1980, when profits were depressed for many companies. Thus, profits were higher for companies like Du Pont, Monsanto, Celanese, and Akzona, in part because their synthetic fibers business was not the disaster last year that it had been the year before. Akzona's earnings still were far below those of 1979, despite last year's improvement, and Du Pont's profits would have been lower were it not for its merger with Conoco.

Profitability, too, held up relatively well, all things considered. About half of the chemical companies increased their margin on sales in 1981 from the year before. Half, too (although not in every case the same firms), had a higher return on net worth.

Companies also were more generous to their stockholders. Three quarters of them increased their dividends in 1981. Only one, Reichhold, paid out less last year.

## Explanation of table headings

**Year.** Data are for calendar year unless otherwise indicated.

**Net sales.** Gross sales, less discounts, allowances, and returns; generally excludes excise taxes and other operating income or revenues.

**Net income.** Net sales and other income, less operating costs, nonoperating charges, depreciation, depletion, interest expense, deferred charges, minority interest in income, and taxes. Nonrecurring or extraordinary credits and charges have been excluded in most cases, but these items are indicated by a footnote.

**Total assets.** Sum at year's end of current assets, investments, prepaid expenses, net plant and equipment, and other tangible assets. Excludes insofar as possible intangible assets including goodwill, value of patents and trademarks, and the like.

**Current ratio.** The ratio of current assets (cash, marketable securities, receivables, and inventories but excluding prepaid expenses) to total current liabilities.

**Net plant and equipment.** Value at year's end of fixed assets, less accumulated depreciation, amortization, and depletion.

**Capital expenditures.** Total spending during the year for new fixed assets, such as plant, equipment, and land, and for replacement and modernization of facilities.

**Net worth.** Equity at year's end of preferred and common stock holders, including value of capital stock, capital and earned surplus, and surplus reserves, as well as contingency and miscellaneous reserves for which no definite purpose is stated. Intangible assets are deducted insofar as possible.

**Net income** (breakdown). **Per cent of sales:** net income divided by net sales. **Per cent of net worth:** net income divided by tangible net worth. **Dollars per share:** net income, less preferred dividends, divided by the number of shares of common stock outstanding. All figures are adjusted for stock splits, but no adjustment has been made for earlier years as a result of stock dividends or for dilution that might result from the conversion of preferred stock or debt to common stock or the exercise of stock options outstanding.

**Dividends per share.** Cash dividends paid (or declared) on each share of common stock; excludes the value of stock dividends, which are indicated by a footnote.

**Dividend yield.** Dividends per share divided by the average of the high and low prices of the common stock during the calendar year.

**Stock price range.** High-low market prices of common stock during the calendar year, adjusted for stock splits but not for stock dividends.

**Price-earnings ratio.** Average of the high and low prices of the common stock during the calendar year divided by net income per share of common stock.

| Year | Net sales | Net income | Total assets | Current ratio | Net plant and equipment | Capital expenditures | Net worth | NET INCOME % of sales | NET INCOME % of net worth | NET INCOME $ per share | Dividends, $ per share | Dividend yield, % of price | Stock price range, $ per share | Price-earnings ratio |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Money figures in thousands of dollars unless otherwise indicated | | | | | | | | | | | | | |
| **CHEMICALS** | | | | | | | | | | | | | | |
| **Air Products & Chemicals** | | | | | | | | | | | | | | |
| 1981[a] | $1,570,115 | $126,039 | $1,871,986 | 1.2 | $1,301,922 | $323,465 | $769,134 | 8.0% | 16.4% | $4.42 | $0.80 | 1.9% | $48⅞-34 | 9.4 |
| 1980[a] | 1,420,759 | 115,502 | 1,744,392 | 1.3 | 1,182,567 | 364,013 | 658,596 | 8.1 | 17.5 | 4.07 | 0.80 | 1.8 | 54¼-32¼ | 10.6 |
| 1979[a] | 1,229,894 | 97,540 | 1,415,024 | 1.3 | 945,013 | 246,050 | 563,702 | 7.9 | 17.3 | 3.45 | 0.65 | 2.1 | 37¼-23¾ | 8.8 |
| 1978[a] | 1,039,052 | 76,184 | 1,180,754 | 1.2 | 801,809 | 199,847 | 477,557 | 7.3 | 16.0 | 2.70 | 0.50 | 1.8 | 31⅞-22½ | 10.1 |
| **Akzona** | | | | | | | | | | | | | | |
| 1981 | $1,187,583 | $11,596 | $836,090 | 2.1 | $409,846 | $59,507 | $320,033 | 1.0% | 3.6% | $0.95 | $0.80 | 6.5% | $15½-9¼ | 13.0 |
| 1980 | 1,054,015 | 4,877 | 846,708 | 2.1 | 412,009 | 64,313 | 319,139 | 0.5 | 1.5 | 0.40 | 0.80 | 6.3 | 17½-7¾ | 31.6 |
| 1979 | 1,012,398 | 25,647 | 818,125 | 2.2 | 402,178 | 54,486 | 323,875 | 2.5 | 7.9 | 2.10 | 0.80 | 5.6 | 17⅛-11¼ | 6.8 |
| 1978 | 868,711 | 20,832 | 704,095 | 2.5 | 374,065 | 42,404 | 307,790 | 2.4 | 6.8 | 1.69 | 0.80 | 6.0 | 15¼-11¼ | 7.8 |
| **Allied Corp.** | | | | | | | | | | | | | | |
| 1981 | $6,407,000 | $343,000[b] | $5,205,000 | 1.4 | $2,866,000 | $609,000 | $2,352,000 | 5.4% | 14.6% | $9.03[b] | $2.35 | 4.8% | $59⅞-39 | 5.5 |
| 1980 | 5,519,000 | 303,000[c] | 4,475,000 | 1.3 | 2,384,000 | 533,000 | 1,861,000 | 5.5 | 16.3 | 8.59[c] | 2.15 | 4.3 | 61¾-39 | 5.9 |
| 1979 | 4,332,391 | 201,080[d] | 4,159,798 | 1.1 | 2,168,816 | 408,668 | 1,377,701 | 4.6 | 14.6 | 6.84[d] | 2.00 | 5.1 | 49½-28½ | 5.7 |
| 1978 | 3,267,956 | 124,557[e] | 3,182,335 | 1.4 | 2,041,409 | 502,040 | 1,226,710 | 3.8 | 10.2 | 4.40[e] | 2.00 | 5.5 | 44¾-27⅝ | 8.2 |
| **American Cyanamid Co.** | | | | | | | | | | | | | | |
| 1981 | $3,649,073 | $197,054 | $3,049,917 | 1.9 | $1,325,063 | $180,697 | $1,513,457 | 5.4% | 13.0% | $4.11 | $1.675 | 5.5% | $36½-24½ | 7.4 |
| 1980 | 3,453,934 | 159,195 | 2,900,289 | 1.8 | 1,328,691 | 195,819 | 1,419,073 | 4.6 | 11.2 | 3.32 | 1.60 | 5.5 | 38-20⅝ | 8.8 |
| 1979 | 3,186,998 | 168,495 | 2,810,725 | 1.6 | 1,303,308 | 235,416 | 1,331,130 | 5.3 | 12.7 | 3.52 | 1.60 | 5.3 | 36⅛-23¾ | 8.5 |
| 1978 | 2,780,170 | 155,943 | 2,510,038 | 1.8 | 1,212,807 | 251,034 | 1,238,396 | 5.6 | 12.6 | 3.26 | 1.50 | 5.4 | 32⅞-22⅝ | 8.5 |

a Fiscal year ends Sept. 30. b Excludes nonrecurring net gain of $5 million ($1.14 per share). c Excludes nonrecurring net loss from estimated plant shutdown and disposal costs of $14 million ($0.44 per share). d From continuing operations; excludes net losses from discontinued businesses of $164.8 million ($5.75 per share) and nonrecurring net loss of $25.4 million ($0.89 per share). e Excludes nonrecurring net loss from sales of plants of $4.3 million ($0.15 per share).

| Year | Net sales | Net income | Total assets | Current ratio | Net plant and equipment | Capital expenditures | Net worth | NET INCOME % of sales | NET INCOME % of net worth | NET INCOME $ per share | Dividends, $ per share | Dividend yield, % of price | Stock price range, $ per share | Price-earnings ratio |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Money figures in thousands of dollars unless otherwise indicated | | | | | | | | | | | | | | |
| **Big Three Industries** | | | | | | | | | | | | | | |
| 1981 | $823,280 | $108,854 | $1,015,259 | 2.7 | $680,709 | $158,234 | $555,765 | 13.2% | 19.6% | $2.57 | $0.60 | 1.9% | $37⅝–25 | 12.2 |
| 1980 | 659,121 | 86,604 | 815,048 | 2.2 | 583,772 | 142,542 | 472,607 | 13.1 | 18.3 | 2.05 | 0.47[a] | 1.7 | 36⅛–18⅞ | 13.4 |
| 1979 | 509,449 | 62,859 | 700,052 | 2.3 | 488,921 | 79,710 | 404,137 | 12.3 | 15.6 | 1.56 | 0.42 | 2.2 | 22¼–15¾ | 12.2 |
| 1978 | 428,934 | 56,718 | 604,437 | 2.2 | 442,707 | 93,374 | 357,478 | 13.2 | 15.9 | 1.41 | 0.34 | 2.0 | 20¼–14½ | 12.3 |
| **Cabot Corp.** | | | | | | | | | | | | | | |
| 1981[b] | $1,622,755 | $110,167 | $2,497,633 | 2.2 | $595,234 | $192,348 | $586,226 | 6.8% | 18.8% | $3.50 | $0.86 | 2.9% | $35½–23⅞ | 8.5 |
| 1980[b] | 1,403,743 | 94,024[c] | 1,138,683 | 2.0 | 456,507 | 117,705 | 497,546 | 6.7 | 18.9 | 3.00[c] | 0.67 | 2.6 | 36⅜–14¾ | 8.5 |
| 1979[b] | 1,122,391 | 70,445 | 918,431 | 2.0 | 401,638 | 68,266 | 358,031 | 6.3 | 19.7 | 2.28 | 0.47 | 3.5 | 16⅝–10⅛ | 5.9 |
| 1978[b] | 713,136 | 46,580 | 752,089 | 2.5 | 353,020 | 111,902 | 303,542 | 6.5 | 15.3 | 1.53 | 0.35 | 3.5 | 12⅞–7 | 6.5 |
| **Celanese Corp.** | | | | | | | | | | | | | | |
| 1981 | $3,752,000 | $144,000 | $2,991,000 | 2.0 | $1,518,000 | $414,000 | $1,233,000 | 3.8% | 11.7% | $9.01 | $3.85 | 6.4% | $69¼–51⅝ | 6.7 |
| 1980 | 3,348,000 | 122,000 | 2,633,000 | 2.0 | 1,197,000 | 253,000 | 1,101,000 | 3.6 | 11.1 | 8.20 | 3.50 | 6.8 | 62⅝–39⅞ | 6.2 |
| 1979 | 3,146,000 | 141,000 | 2,374,000 | 1.8 | 1,150,000 | 245,000 | 1,033,000 | 4.5 | 13.6 | 9.52 | 3.10 | 7.0 | 48¾–39⅜ | 4.6 |
| 1978 | 2,609,000 | 112,000[d] | 2,143,000 | 2.0 | 1,148,000 | 248,000 | 936,000 | 4.3 | 12.0 | 7.61[d] | 2.85 | 6.9 | 47⅛–35⅝ | 5.4 |
| **Crompton & Knowles Corp.** | | | | | | | | | | | | | | |
| 1981 | $243,412 | $8,571 | $132,197 | 2.3 | $32,668 | $6,699 | $63,606 | 3.5% | 13.5% | $2.51 | $0.95 | 6.1% | $18⅛–12⅞ | 6.2 |
| 1980 | 241,776 | 7,666 | 135,619 | 2.5 | 34,731 | 9,623 | 58,935 | 3.2 | 13.0 | 2.22 | 0.80 | 5.8 | 16⅝–10⅞ | 6.2 |
| 1979 | 239,638 | 7,075 | 131,433 | 2.2 | 28,822 | 7,895 | 55,212 | 3.0 | 12.8 | 2.03 | 0.69 | 6.6 | 12¼–8⅝ | 5.1 |
| 1978 | 217,412 | 6,137 | 127,177 | 2.3 | 25,110 | 4,484 | 49,699 | 2.8 | 12.3 | 1.77 | 0.64 | 6.1 | 12⅝–8⅜ | 6.0 |
| **Diamond Shamrock Corp.** | | | | | | | | | | | | | | |
| 1981 | $3,376,215 | $230,156[e] | $2,933,550 | 1.9 | $1,726,458 | $520,917 | $1,266,900 | 6.8% | 18.2% | $3.68[e] | $1.70 | 5.4% | $39⅝–23¾ | 8.6 |
| 1980 | 3,143,040 | 201,214 | 2,707,284 | 2.1 | 1,600,250 | 381,036 | 1,155,950 | 6.4 | 17.4 | 3.66 | 1.62 | 5.2 | 38⅞–23⅛ | 8.5 |
| 1979 | 2,356,858 | 178,123 | 2,329,892 | 1.9 | 1,382,931 | 256,564 | 931,267 | 7.6 | 19.1 | 3.37 | 1.51 | 6.0 | 31½–19 | 7.5 |
| 1978 | 1,677,602 | 131,063 | 1,969,509 | 1.9 | 1,294,970 | 286,843 | 790,555 | 7.8 | 16.6 | 3.26 | 1.42 | 5.8 | 29¾–19 | 7.5 |
| **Dow Chemical Co.** | | | | | | | | | | | | | | |
| 1981 | $11,873,000 | $564,000 | $12,268,000 | 1.7 | $6,174,000 | $1,176,000 | $4,663,000 | 4.8% | 12.1% | $3.00 | $1.80 | 5.8% | $ 39–23⅜ | 10.4 |
| 1980 | 10,626,000 | 753,000[f] | 11,429,000 | 1.5 | 5,672,000 | 1,184,000 | 4,331,000 | 7.1 | 17.4 | 4.14[f] | 1.60 | 4.7 | 39¼–28¼ | 8.2 |
| 1979 | 9,255,387 | 734,000[g] | 10,144,745 | 1.4 | 5,236,404 | 1,267,719 | 3,789,746 | 7.9 | 19.4 | 4.05[g] | 1.45 | 4.9 | 34⅞–24⅜ | 7.3 |
| 1978 | 6,887,623 | 575,224 | 8,705,081 | 1.6 | 4,762,129 | 1,075,173 | 3,310,655 | 8.4 | 17.4 | 3.16 | 1.25 | 4.7 | 30⅞–22 | 8.4 |
| **E. I. du Pont de Nemours & Co.** | | | | | | | | | | | | | | |
| 1981 | $22,810,000 | $1,081,000[h] | $23,829,000 | 2.0 | $12,722,000 | $2,389,000 | $10,458,000 | 4.7% | 10.3% | $5.81[h] | $2.75 | 6.0% | $ 56–35¾ | 7.9 |
| 1980 | 13,652,000 | 716,000 | 9,560,000 | 2.3 | 4,414,000 | 1,279,000 | 5,690,000 | 5.2 | 12.6 | 4.63 | 2.75 | 6.8 | 49½–31⅛ | 8.3 |
| 1979 | 12,571,800 | 938,900 | 8,918,700 | 2.5 | 3,942,400 | 864,000 | 5,290,600 | 7.5 | 17.7 | 6.42 | 2.75 | 6.5 | 48¼–37 | 6.6 |
| 1978 | 10,584,200 | 787,000 | 8,047,700 | 2.3 | 3,839,000 | 714,200 | 4,737,800 | 7.4 | 16.6 | 5.39 | 2.42 | 6.1 | 46⅛–32½ | 7.3 |
| **Ethyl Corp.** | | | | | | | | | | | | | | |
| 1981 | $1,757,195 | $90,891 | $1,194,630 | 2.2 | $658,282 | $140,520 | $683,001 | 5.2% | 13.3% | $4.56 | $1.50 | 5.3% | $34½–23⅞ | 6.2 |
| 1980 | 1,740,627 | 82,397[i] | 1,138,233 | 2.4 | 602,029 | 156,388 | 631,831 | 4.7 | 13.0 | 4.11[i] | 1.50 | 5.1 | 36½–22¼ | 7.1 |
| 1979 | 1,656,977 | 97,515 | 1,070,968 | 2.8 | 512,981 | 122,878 | 536,671 | 5.9 | 18.2 | 4.94 | 1.35 | 5.3 | 30–21 | 5.2 |
| 1978 | 1,422,451 | 82,698 | 1,001,584 | 2.9 | 446,346 | 95,803 | 514,693 | 5.8 | 16.1 | 4.24 | 1.10 | 5.1 | 24⅞–18½ | 5.1 |
| **Ferro Corp.** | | | | | | | | | | | | | | |
| 1981 | $702,213 | $25,503 | $389,435 | 2.1 | $135,587 | $24,243 | $222,441 | 3.6% | 11.5% | $3.30 | $1.20 | 4.6% | $31½–20¾ | 7.9 |
| 1980 | 695,580 | 29,019 | 430,472 | 2.0 | 134,563 | 31,505 | 220,597 | 4.2 | 13.2 | 3.77 | 1.20 | 5.8 | 24¼–17 | 5.5 |
| 1979 | 591,930 | 30,912 | 387,703 | 1.8 | 115,831 | 33,132 | 200,625 | 5.2 | 15.4 | 4.07 | 1.14 | 4.7 | 29⅜–19 | 5.9 |
| 1978 | 494,414 | 27,657 | 310,612 | 2.0 | 86,805 | 19,385 | 175,618 | 5.6 | 15.7 | 3.67 | 1.05 | 4.0 | 35–17⅛ | 7.1 |
| **First Mississippi Corp.** | | | | | | | | | | | | | | |
| 1981[j] | $357,697 | $29,704 | $318,926 | 1.5 | $117,244 | $58,277 | $138,384 | 8.3% | 21.5% | $1.38 | $0.23 | 1.2% | $26⅛–13⅛ | 14.2 |
| 1980[j] | 242,690 | 21,154 | 236,579 | 2.1 | 83,525 | 37,202 | 113,672 | 8.7 | 18.6 | 0.98 | 0.18 | 0.9 | 30¾–7½ | 19.5 |
| 1979[j] | 178,400 | 4,661 | 200,370 | 2.8 | 63,942 | 17,046 | 95,073 | 2.6 | 4.9 | 0.22 | 0.16 | 2.0 | 11¾–4 | 35.8 |
| 1978[j] | 155,525 | 4,170 | 205,837 | 2.9 | 72,190 | 12,558 | 93,528 | 2.7 | 4.5 | 0.20 | 0.16 | 3.2 | 6⅝–3¼ | 25.0 |
| **W. R. Grace & Co.** | | | | | | | | | | | | | | |
| 1981 | $6,520,800 | $361,300[k] | $4,947,100 | 1.5 | $2,528,600 | $656,900 | $1,986,600 | 5.5% | 18.2% | $7.58[k] | $2.45 | 5.0% | $59⅝–38½ | 6.5 |
| 1980 | 6,101,300 | 283,800[l] | 4,281,500 | 1.5 | 2,162,700 | 657,400 | 1,713,100 | 4.7 | 16.6 | 6.08[l] | 2.175 | 4.5 | 63½–32⅝ | 7.9 |
| 1979 | 5,266,629 | 222,580[m] | 3,680,847 | 1.6 | 1,629,361 | 477,688 | 1,524,276 | 4.2 | 14.6 | 5.02[m] | 1.975 | 5.9 | 41¼–25⅝ | 6.7 |
| 1978 | 4,309,588 | 170,403[n] | 3,201,126 | 1.9 | 1,317,159 | 275,308 | 1,333,772 | 4.0 | 12.8 | 4.23[n] | 1.85 | 6.6 | 32⅜–23¾ | 6.6 |
| **Great Lakes Chemical Corp.** | | | | | | | | | | | | | | |
| 1981 | $150,333 | $18,031 | $170,198 | 1.9 | $98,580 | $22,777 | $108,878 | 12.0% | 16.6% | $2.51 | $0.44 | 0.9% | $58½–36¼ | 18.9 |
| 1980 | 126,705 | 18,948 | 118,407 | 3.2 | 61,747 | 20,496 | 93,258 | 15.0 | 20.3 | 2.67 | 0.36 | 0.8 | 51¼–35⅝ | 16.3 |
| 1979 | 122,491 | 15,606 | 99,323 | 2.8 | 48,802 | 18,315 | 75,457 | 15.2 | 24.7 | 2.65 | 0.28 | 0.9 | 39¼–22½ | 11.7 |
| 1978 | 87,435 | 13,276 | 78,762 | 2.8 | 36,229 | 8,515 | 57,800 | 15.2 | 23.0 | 1.92 | 0.205 | 1.0 | 25½–14¾ | 10.5 |

a Plus 5% stock dividend. b Fiscal year ends Sept. 30. c From continuing operations; excludes net income from discontinued operations of $12.3 million ($0.39 per share) and gain on sale of machinery division of $46.4 million ($1.49 per share). d Excludes cumulative effects of change in accounting for investment tax credits of $3 million ($3.01 per share). e From continuing operations; excludes net loss from operations and disposal of plastics and animal nutrition businesses of $108.9 million ($1.74 per share). f Excludes net gain on sale of Wanda Petroleum Co. of $52 million ($0.28 per share). g Excludes net gain on sale of Canadian oil and gas properties of $50 million ($0.28 per share). h Excludes cumulative effects of change in accounting for investment tax credits of $320 million ($1.74 per share). i Excludes net capital gain on sale of property of $7.3 million ($0.38 per share). j Fiscal year ends June 30. k Includes net gains on disposal of businesses of $31.1 million. l Includes net losses on disposal of businesses of $10.3 million. m Includes net gains on disposal of businesses of $5.2 million. n Includes net gains on disposal of businesses of $8.0 million.

| Year | Net sales | Net income | Total assets | Current ratio | Net plant and equipment | Capital expenditures | Net worth | NET INCOME % of sales | NET INCOME % of net worth | NET INCOME $ per share | Dividends, $ per share | Dividend yield, % of price | Stock price range, $ per share | Price-earnings ratio |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Money figures in thousands of dollars unless otherwise indicated | | | | | | | | | | | | | |
| **Hercules** | | | | | | | | | | | | | | |
| 1981 | $2,718,366 | $136,481 | $1,997,144 | 2.5 | $907,733 | $167,189 | $1,051,357 | 5.0% | 13.0% | $3.09 | $1.26 | 5.6% | $26 3/8–18 3/4 | 7.3 |
| 1980 | 2,485,226 | 114,000 | 1,889,679 | 2.0 | 872,656 | 229,163 | 1,009,746 | 4.6 | 11.3 | 2.60 | 1.20 | 6.0 | 25–15 1/8 | 7.7 |
| 1979 | 2,345,425 | 144,500[a] | 1,761,177 | 1.9 | 772,889 | 185,998 | 945,422 | 6.2 | 15.3 | 3.27[a] | 1.075 | 5.5 | 22 3/4–16 1/8 | 5.9 |
| 1978 | 1,946,477 | 103,264[b] | 1,590,306 | 1.9 | 714,286 | 115,807 | 812,159 | 5.3 | 12.7 | 2.36[b] | 1.00 | 6.5 | 18 5/8–12 1/4 | 6.5 |
| **Philip A. Hunt Chemical Corp.** | | | | | | | | | | | | | | |
| 1981 | $111,871 | $3,816[c] | $87,238 | 2.6 | $36,231 | $9,105 | $56,005 | 3.4% | 6.8% | $0.67[c] | $0.40 | 3.9% | $12 1/8–8 1/2 | 15.4 |
| 1980 | 106,296 | 4,044[d] | 78,020 | 3.0 | 32,376 | 6,930 | 56,788 | 3.8 | 7.1 | 0.71[d] | 0.40 | 3.5 | 14 1/4–8 1/2 | 16.0 |
| 1979 | 106,004 | 8,015 | 72,794 | 3.4 | 29,067 | 9,206 | 55,606 | 7.6 | 14.4 | 1.41 | 0.40 | 2.9 | 17–11 | 9.9 |
| 1978 | 91,347 | 7,455 | 66,467 | 3.8 | 22,564 | 3,885 | 49,993 | 8.2 | 15.3 | 1.31 | 0.37 | 2.9 | 15 3/4–10 | 9.8 |
| **International Flavors & Fragrances** | | | | | | | | | | | | | | |
| 1981 | $451,088 | $66,123 | $430,890 | 3.8 | $125,975 | $16,558 | $329,878 | 14.7% | 20.0% | $1.81 | $0.94 | 4.6% | $ 23–17 7/8 | 11.3 |
| 1980 | 448,309 | 63,232 | 414,859 | 3.8 | 121,228 | 17,461 | 315,485 | 14.1 | 20.0 | 1.73 | 0.86 | 3.9 | 27 1/2–16 5/8 | 12.8 |
| 1979 | 409,299 | 61,472 | 387,807 | 3.6 | 114,255 | 15,180 | 285,425 | 15.0 | 21.5 | 1.68 | 0.74 | 3.4 | 25 5/8–18 1/4 | 13.1 |
| 1978 | 365,881 | 56,199 | 345,073 | 3.4 | 109,092 | 20,014 | 252,706 | 15.4 | 22.2 | 1.53 | 0.59 | 2.5 | 27 5/8–19 5/8 | 15.4 |
| **International Minerals & Chemical Corp.** | | | | | | | | | | | | | | |
| 1981 | $1,984,900 | $153,800 | $1,975,200 | 1.7 | $1,896,300 | $336,600 | $975,300 | 7.7% | 15.8% | $5.63 | $2.46 | 5.1% | $66 1/2–30 3/8 | 8.6 |
| 1980[e] | 1,789,600 | 145,900 | 1,848,600 | 2.0 | 1,062,900 | 262,100 | 881,300 | 8.2 | 16.6 | 5.38 | 2.16 | 4.5 | 66 1/2–30 | 9.0 |
| 1979[e] | 1,474,700 | 120,800 | 1,537,600 | 1.7 | 936,600 | 173,500 | 790,200 | 8.2 | 15.3 | 4.48 | 1.87 | 5.8 | 41–23 1/2 | 7.2 |
| 1978[e] | 1,364,400 | 120,100 | 1,461,900 | 1.9 | 879,400 | 193,600 | 721,000 | 8.8 | 16.7 | 4.41 | 1.73 | 6.7 | 29–22 5/8 | 5.9 |
| **Liquid Air Corp.** | | | | | | | | | | | | | | |
| 1981 | $427,991 | $31,526[f] | $465,128 | 1.6 | $285,026 | $61,818 | $239,775 | 7.4% | 13.1% | $2.86[f] | $1.55 | 6.7% | $29 3/4–16 3/4 | 8.1 |
| 1980 | 408,249 | 27,448[g] | 425,502 | 1.6 | 270,778 | 60,469 | 202,832 | 6.7 | 13.5 | 2.57[g] | 1.40 | 5.2 | 34 1/2–19 3/4 | 10.6 |
| 1979 | 369,109 | 24,698 | 399,354 | 1.7 | 259,906 | 50,714 | 191,641 | 6.7 | 12.9 | 2.49 | 1.40 | 5.3 | 28 3/4–23 3/4 | 10.5 |
| 1978 | 304,266 | 18,346 | 299,419 | 1.8 | 180,327 | 37,092 | 121,097 | 6.0 | 15.1 | 2.48 | 1.40 | 5.2 | 30 1/2–23 1/2 | 10.9 |
| **Lubrizol Corp.** | | | | | | | | | | | | | | |
| 1981 | $878,291 | $ 92,031 | $673,165 | 2.6 | $284,088 | $75,399 | $478,518 | 10.5% | 19.2% | $2.36 | $1.08 | 3.9% | $35 1/2–20 3/8 | 11.8 |
| 1980 | 902,312 | 111,511 | 651,137 | 2.5 | 248,664 | 92,140 | 452,787 | 12.4 | 24.6 | 2.87 | 0.90 | 2.7 | 41 3/4–24 7/8 | 11.6 |
| 1979 | 724,734 | 90,775 | 519,942 | 2.5 | 180,405 | 50,807 | 374,751 | 12.5 | 24.2 | 2.33 | 0.80 | 3.2 | 30–20 1/2 | 10.8 |
| 1978 | 586,477 | 77,365 | 441,735 | 2.8 | 150,018 | 44,373 | 323,036 | 13.2 | 23.9 | 1.97 | 0.70 | 3.4 | 24 1/8–16 3/4 | 10.3 |
| **Monsanto Co.** | | | | | | | | | | | | | | |
| 1981 | $6,947,700 | $445,100[h] | $6,069,200 | 2.2 | $3,183,900 | $667,900 | $3,330,200 | 6.4% | 13.4% | $11.50 | $3.75 | 5.1% | $87 1/2–59 1/2 | 6.4 |
| 1980 | 6,573,600 | 148,800[i] | 5,796,400 | 1.9 | 3,109,100 | 780,500 | 2,808,200 | 2.3 | 5.3 | 4.10[i] | 3.55 | 6.3 | 70 1/4–42 1/4 | 13.7 |
| 1979 | 6,192,600 | 331,000[j] | 5,539,100 | 2.2 | 2,817,800 | 565,900 | 2,781,800 | 5.3 | 11.9 | 9.11[j] | 3.35 | 6.3 | 62–45 | 5.9 |
| 1978 | 5,018,700 | 302,600[k] | 5,035,700 | 2.5 | 2,604,800 | 479,900 | 2,579,400 | 6.0 | 11.7 | 8.29[k] | 3.175 | 6.1 | 60 1/4–44 1/8 | 6.3 |
| **Nalco Chemical Co.** | | | | | | | | | | | | | | |
| 1981 | $666,591 | $81,209 | $466,375 | 2.2 | $176,959 | $59,423 | $335,974 | 12.2% | 24.2% | $2.02 | $1.00 | 4.0% | $29 1/8–20 1/2 | 12.3 |
| 1980 | 616,709 | 72,261 | 416,233 | 2.7 | 138,137 | 34,923 | 306,550 | 11.7 | 23.6 | 1.80 | 0.80 | 3.9 | 26 5/8–14 | 11.2 |
| 1979 | 578,908 | 63,277 | 368,074 | 2.5 | 126,774 | 39,018 | 261,966 | 10.9 | 24.2 | 1.59 | 0.68 | 4.4 | 17 5/8–13 1/8 | 9.7 |
| 1978 | 476,208 | 53,652[l] | 309,666 | 2.5 | 105,197 | 34,278 | 221,814 | 11.3 | 24.2 | 1.35[l] | 0.62 | 4.3 | 16 3/8–12 1/4 | 10.5 |
| **Olin Corp.** | | | | | | | | | | | | | | |
| 1981 | $2,001,346 | $92,836 | $1,618,034 | 1.6 | $844,927 | $186,331 | $793,187 | 4.6% | 11.7% | $3.88 | $1.15 | 4.9% | $ 27–19 1/2 | 6.0 |
| 1980 | 1,852,853 | 73,931[m] | 1,550,128 | 1.7 | 822,412 | 172,016 | 750,120 | 4.0 | 9.9 | 3.08[m] | 1.025 | 5.8 | 23 1/8–12 1/2 | 5.8 |
| 1979 | 1,778,102 | 71,150 | 1,461,073 | 1.7 | 764,108 | 161,151 | 739,992 | 4.0 | 9.6 | 2.97 | 0.97 | 4.7 | 25–16 1/8 | 6.9 |
| 1978 | 1,560,075 | 62,769 | 1,393,064 | 1.7 | 742,158 | 162,519 | 691,563 | 4.0 | 9.1 | 2.62 | 0.88 | 4.5 | 25 3/4–13 3/8 | 7.5 |
| **Pennwalt Corp.** | | | | | | | | | | | | | | |
| 1981 | $1,056,118 | $36,661[n] | $755,755 | 2.1 | $309,525 | $52,696 | $367,098 | 3.5% | 10.0% | $3.55[n] | $2.20 | 7.1% | $ 36–26 1/4 | 8.8 |
| 1980 | 1,188,702 | 43,291 | 810,761 | 2.0 | 314,315 | 55,546 | 373,363 | 3.6 | 11.6 | 4.20 | 2.20 | 7.4 | 34 3/8–25 3/8 | 7.1 |
| 1979 | 1,079,303 | 49,997 | 775,355 | 2.1 | 298,420 | 67,486 | 346,140 | 4.6 | 14.4 | 5.01 | 2.20 | 6.1 | 35 7/8–30 1/2 | 6.6 |
| 1978 | 921,369 | 44,973 | 672,343 | 2.1 | 270,374 | 61,938 | 317,073 | 4.9 | 14.2 | 4.54 | 2.00 | 5.4 | 42 1/2–31 1/2 | 8.1 |
| **Reichhold Chemicals** | | | | | | | | | | | | | | |
| 1981 | $950,112 | $17,054[o] | $405,477 | 2.3 | $173,398 | $15,908 | $206,727 | 1.8% | 8.2% | $2.04[o] | $0.48 | 3.5% | $ 16–11 1/8 | 6.6 |
| 1930 | 885,059 | 16,114 | 424,760 | 2.1 | 179,550 | 22,656 | 203,941 | 1.8 | 7.9 | 1.90 | 0.61 | 5.0 | 15–9 5/8 | 6.5 |
| 1979 | 874,854 | 12,230 | 425,478 | 2.0 | 179,960 | 26,114 | 194,619 | 1.4 | 6.3 | 1.34 | 0.74 | 5.4 | 16–11 1/4 | 10.2 |
| 1978 | 753,885 | 12,038[p] | 393,433 | 2.0 | 173,791 | 24,287 | 190,493 | 1.6 | 6.3 | 1.32[p] | 0.74 | 5.4 | 16 1/2–11 | 10.4 |
| **Rohm & Haas Co.** | | | | | | | | | | | | | | |
| 1981 | $1,884,664 | $93,085[q] | $1,348,627 | 2.4 | $537,489 | $181,635 | $759,911 | 4.9% | 12.2% | $7.21[q] | $2.56 | 4.3% | $71 3/4–46 3/4 | 8.2 |
| 1980 | 1,725,304 | 93,744 | 1,240,456 | 2.6 | 488,185 | 93,013 | 703,124 | 5.4 | 13.3 | 7.26 | 2.16 | 4.9 | 55 1/4–32 3/4 | 6.1 |
| 1979 | 1,590,484 | 95,495[r] | 1,191,903 | 2.3 | 487,841 | 68,328 | 637,398 | 6.0 | 15.0 | 7.39[r] | 1.76 | 4.4 | 48 1/2–31 1/2 | 5.4 |
| 1978 | 1,253,543 | 57,798[s] | 1,074,656 | 2.3 | 464,335 | 66,431 | 557,511 | 4.6 | 10.4 | 4.49[s] | 1.40 | 4.1 | 40 1/4–28 1/8 | 13.1 |

**a** Excludes net gain on sale of pigments and methanol assets of $28.0 million ($0.62 per share). **b** Includes net loss from write-down of facilities of $4.9 million ($0.11 per share). **c** From continuing operations; excludes net loss on disposal of photofinishing business of $146,000 ($0.03 per share). **d** From continuing operations; excludes net loss on operations and disposal of photofinishing business of $1.9 million ($0.33 per share). **e** Fiscal year ends June 30. **f** Includes gain on sale of assets, before taxes, of $1.0 million. **g** Excludes net gain on sale of assets of $2.0 million ($0.19 per share). **h** Includes net gain on sale of joint venture of $67.7 million ($1.75 per share). **i** Includes net loss on withdrawal from polyester filament business in the U.S. of $69.0 million ($1.90 per share) and from termination of interest in Aiscondel of $38.7 million ($1.07 per share). **j** Includes nonrecurring net charges for shutdown of European businesses of $53.2 million ($1.47 per share). **k** Includes net gain from divestiture of various businesses of $8.7 million. **l** From continuing operations; excludes net loss from discontinued Scientific Services operations of $14.5 million ($0.73 per share). **m** Excludes net charge for restructuring of Winchester group of $40.0 million ($1.07 per share). **n** From continuing operations; includes cost of shutdown of chlorine-caustic plant, before taxes, of $21.5 million but excludes net loss on operations and disposal of discontinued businesses of $11.4 million ($1.10 per share) and nonrecurring net gain from cumulative effect of change in accounting for investment credit of $16.3 million ($1.57 per share). **o** Excludes net extraordinary charge for settlement of litigation of $2.4 million ($0.34 per share). **p** Includes loss on abandonment of phenol facility of $4.4 million ($0.38 per share). **q** Includes net loss from shutdown and disposal of assets of $6.6 million ($0.50 per share). **r** Excludes extraordinary tax credit of $7.3 million ($0.57 per share). **s** From continuing operations; excludes provision for loss on disposal of discontinued operations of $2.5 million ($0.19 per share).

# Finances of the U.S. Chemical Industry 2

| Year | Net sales | Net income | Total assets | Current ratio | Net plant and equipment | Capital expenditures | Net worth | NET INCOME % of sales | NET INCOME % of net worth | NET INCOME $ per share | Dividends, $ per share | Dividend yield, % of price | Stock price range, $ per share | Price-earnings ratio |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Money figures in thousands of dollars unless otherwise indicated | | | | | | | | | | | | | |
| **Stauffer Chemical Co.** | | | | | | | | | | | | | | |
| 1981 | $1,726,236 | $150,093[a] | $2,013,863 | 2.4 | $1,170,253 | $238,555 | $1,009,034 | 8.7% | 14.9% | $3.41[a] | $1.29 | 5.5% | $27¾-18¾ | 6.8 |
| 1980 | 1,695,219 | 121,743[b] | 2,084,441 | 1.4 | 1,072,896 | 246,454 | 909,490 | 7.2 | 13.4 | 2.77[b] | 1.175 | 6.0 | 24⅜-14½ | 7.0 |
| 1979 | 1,526,160 | 135,961 | 1,846,866 | 1.7 | 1,040,542 | 239,303 | 821,777 | 8.9 | 16.5 | 3.10 | 1.075 | 5.0 | 25-17¾ | 6.9 |
| 1978 | 1,328,114 | 126,015 | 1,635,956 | 2.0 | 903,246 | 201,196 | 730,064 | 9.5 | 17.3 | 2.88 | 0.975 | 4.7 | 24⅝-17 | 7.2 |
| **Stepan Chemical Co.** | | | | | | | | | | | | | | |
| 1981 | $204,522 | $6,545[c] | $176,068 | 1.5 | $67,906 | $12,083 | $53,888 | 3.2% | 12.1% | $1.74 | $0.515 | 3.0% | $21⅞-12⅜ | 9.8 |
| 1980 | 157,517 | 3,683[d] | 137,688 | 1.5 | 64,338 | 9,204 | 50,498 | 2.3 | 7.3 | 0.98[d] | 0.47 | 4.5 | 12¼-8½ | 10.5 |
| 1979 | 144,981 | 4,794[e] | 112,700 | 2.3 | 66,121 | 13,575 | 46,399 | 3.3 | 10.3 | 1.28[e] | 0.415 | 4.2 | 11¾-8¼ | 7.8 |
| 1978 | 122,947 | 4,613 | 97,191 | 2.5 | 58,367 | 13,738 | 42,530 | 3.8 | 10.8 | 1.23 | 0.37 | 3.4 | 13½-8⅝ | 8.8 |
| **Union Carbide Corp.** | | | | | | | | | | | | | | |
| 1981 | $10,168,000 | $649,000 | $10,366,000 | 2.1 | $5,794,000 | $1,186,000 | $5,206,000 | 6.4% | 12.5% | $ 9.56 | $3.30 | 6.1% | $62⅛-45¼ | 5.6 |
| 1980 | 9,994,000 | 673,000[f] | 9,600,000 | 2.1 | 5,207,000 | 1,129,000 | 4,717,000 | 6.7 | 14.3 | 10.08[f] | 3.10 | 7.1 | 52½-35¼ | 4.4 |
| 1979 | 9,176,500 | 556,200[g] | 8,710,000 | 2.1 | 4,458,300 | 831,300 | 3,949,900 | 6.1 | 14.1 | 8.47[g] | 2.90 | 7.4 | 44½-34 | 4.6 |
| 1978 | 7,869,700 | 394,300[h] | 7,776,000 | 2.0 | 4,118,900 | 687,800 | 3,548,300 | 5.0 | 11.1 | 6.09[h] | 2.80 | 7.3 | 43¼-33⅝ | 6.3 |
| **Williams Cos.** | | | | | | | | | | | | | | |
| 1981 | $1,976,336 | $ 99,167[i] | $2,445,877 | 1.6 | $1,497,797 | $233,184 | $1,027,245 | 5.0% | 9.7% | $3.32[i] | $1.20 | 2.4% | $46⅝-23½ | 10.6 |
| 1980 | 2,072,686 | 138,696 | 2,380,001 | 1.8 | 1,417,799 | 339,625 | 965,715 | 6.7 | 14.4 | 5.07 | 1.10 | 2.9 | 49⅜-26¾ | 7.5 |
| 1979 | 1,850,013 | 69,450 | 2,005,511 | 1.7 | 1,190,526 | 112,995 | 737,949 | 3.8 | 9.4 | 2.55 | 1.00 | 4.2 | 32¼-15 | 9.3 |
| 1978 | 1,497,008 | 29,534[j] | 2,075,114 | 1.6 | 1,223,884 | 131,940 | 705,567 | 2.0 | 4.2 | 1.09[j] | 1.00 | 5.3 | 23⅝-14 | 17.3 |
| **Witco Chemical Corp.** | | | | | | | | | | | | | | |
| 1981 | $1,291,878 | $38,580 | $707,181 | 1.7 | $281,945 | $55,479 | $277,973 | 3.0% | 13.9% | $4.14 | $1.65 | 6.1% | $31½-22¾ | 6.6 |
| 1980 | 1,175,695 | 40,954 | 612,862 | 2.1 | 238,761 | 45,663 | 248,315 | 3.5 | 16.5 | 4.50 | 1.50 | 5.6 | 33¾-20¼ | 6.0 |
| 1979 | 966,758 | 42,782 | 551,891 | 1.9 | 192,902 | 40,890 | 222,686 | 4.4 | 19.2 | 4.83 | 1.30 | 5.1 | 30½-20 | 5.2 |
| 1978 | 751,733 | 33,495 | 405,042 | 1.9 | 166,475 | 31,991 | 189,844 | 4.5 | 17.6 | 3.86 | 1.11 | 5.3 | 24⅞-16⅝ | 5.4 |
| **PHARMACEUTICALS** | | | | | | | | | | | | | | |
| **Abbott Laboratories** | | | | | | | | | | | | | | |
| 1981 | $2,342,524 | $247,283 | $2,355,613 | 1.1 | $729,402 | $200,600 | $1,152,050 | 10.6% | 21.5% | $2.01 | $0.72 | 2.6% | $32¼-23⅝ | 13.9 |
| 1980 | 2,038,155 | 214,413 | 2,062,835 | 1.2 | 583,214 | 162,548 | 1,027,222 | 10.5 | 20.9 | 1.73 | 0.60 | 2.6 | 28½-17 | 13.2 |
| 1979 | 1,683,168 | 178,981[k] | 1,729,296 | 1.3 | 466,970 | 109,636 | 896,028 | 10.6 | 20.0 | 1.48[k] | 0.50 | 2.7 | 21¾-14¾ | 12.3 |
| 1978 | 1,445,017 | 148,626[l] | 1,453,233 | 1.4 | 403,452 | 84,149 | 773,505 | 10.3 | 19.2 | 1.24[l] | 0.39 | 2.4 | 20-12½ | 13.1 |
| **American Home Products Corp.** | | | | | | | | | | | | | | |
| 1981 | $4,131,237 | $497,332 | $2,517,541 | 3.0 | $492,879 | $99,852 | $1,583,475 | 12.0% | 31.4% | $3.18 | $1.90 | 5.8% | $37¼-28⅛ | 10.3 |
| 1980 | 3,798,524 | 445,889 | 2,289,460 | 2.8 | 450,490 | 99,393 | 1,391,972 | 11.7 | 32.0 | 2.84 | 1.70 | 6.4 | 31⅞-21⅜ | 9.4 |
| 1979 | 3,401,301 | 396,039 | 2,007,977 | 3.0 | 408,899 | 87,809 | 1,239,315 | 11.6 | 32.0 | 2.51 | 1.50 | 5.6 | 29½-24⅜ | 10.7 |
| 1978 | 3,062,633 | 348,422 | 1,779,023 | 2.9 | 369,214 | 67,631 | 1,094,798 | 11.4 | 31.8 | 2.21 | 1.325 | 4.5 | 32¾-26⅛ | 13.3 |
| **Baxter Travenol Laboratories** | | | | | | | | | | | | | | |
| 1981 | $1,503,890 | $150,581 | $1,590,743 | 2.6 | $583,084 | $ 87,101 | $978,325 | 10.0% | 15.4% | $2.15 | $0.38 | 1.3% | $33¾-24 | 13.4 |
| 1980 | 1,374,384 | 128,400 | 1,412,638 | 2.8 | 560,690 | 118,645 | 852,606 | 9.3 | 15.1 | 1.86 | 0.32 | 1.4 | 28⅜-17⅞ | 12.4 |
| 1979 | 1,191,193 | 111,908[m] | 1,290,928 | 2.3 | 500,976 | 103,654 | 723,510 | 9.4 | 15.5 | 1.14[m] | 0.25 | 1.2 | 24¾-17¾ | 12.9 |
| 1978 | 1,004,196 | 91,683[n] | 1,129,637 | 2.2 | 445,223 | 90,057 | 612,231 | 9.1 | 15.0 | 1.37[n] | 0.20 | 1.0 | 24⅞-16⅜ | 15.1 |
| **Bristol-Myers Co.** | | | | | | | | | | | | | | |
| 1981 | $3,496,700 | $305,800 | $2,406,000 | 2.2 | $581,800 | $159,300 | $1,482,000 | 8.7% | 20.6% | $4.58 | $1.78 | 3.4% | $58¾-45¾ | 11.4 |
| 1980 | 3,158,300 | 270,600 | 2,125,500 | 2.3 | 484,900 | 131,600 | 1,296,200 | 8.6 | 20.9 | 4.08 | 1.56 | 3.8 | 52-30½ | 10.1 |
| 1979 | 2,752,777 | 231,545 | 1,837,648 | 2.4 | 407,528 | 95,022 | 1,117,002 | 8.4 | 20.7 | 3.50 | 1.385 | 4.0 | 38¼-31 | 9.9 |
| 1978 | 2,450,429 | 203,048 | 1,619,015 | 2.3 | 358,515 | 81,922 | 981,624 | 8.3 | 20.7 | 3.08 | 1.19 | 3.5 | 40⅜-28 | 11.1 |
| **Eli Lilly & Co.** | | | | | | | | | | | | | | |
| 1981 | $2,773,205 | $374,478 | $2,902,262 | 1.9 | $1,006,180 | $253,735 | $1,888,260 | 13.5% | 19.8% | $4.93 | $2.375 | 4.2% | $58¾-45¼ | 11.6 |
| 1980 | 2,558,637 | 341,974 | 2,607,452 | 2.0 | 849,034 | 230,700 | 1,736,693 | 13.4 | 19.7 | 4.52 | 2.20 | 4.0 | 65½-45¾ | 12.3 |
| 1979 | 2,205,764 | 329,531 | 2,179,132 | 2.4 | 672,610 | 172,678 | 1,570,439 | 14.9 | 21.0 | 4.52 | 1.95 | 3.5 | 63⅞-47⅛ | 12.3 |
| 1978 | 1,852,090 | 277,475 | 2,049,901 | 2.1 | 551,657 | 89,550 | 1,384,082 | 15.0 | 20.0 | 3.81 | 1.65 | 3.6 | 54-36⅝ | 11.9 |
| **Merck & Co.** | | | | | | | | | | | | | | |
| 1981 | $2,929,455 | $398,265 | $3,310,000 | 1.7 | $1,395,567 | $322,814 | $2,061,460 | 13.6% | 19.9% | $5.36 | $2.60 | 2.9% | $103-76¼ | 16.7 |
| 1980 | 2,734,012 | 415,396 | 2,865,755 | 2.3 | 1,185,244 | 256,488 | 1,863,322 | 15.2 | 22.3 | 5.54 | 2.30 | 3.2 | 86-58¼ | 13.0 |
| 1979 | 2,384,627 | 381,776 | 2,614,064 | 2.2 | 1,027,644 | 170,134 | 1,665,496 | 16.0 | 22.9 | 5.06 | 1.90 | 2.8 | 74¼-62½ | 13.5 |
| 1978 | 1,981,440 | 307,534 | 2,251,348 | 2.4 | 924,179 | 155,853 | 1,455,135 | 15.5 | 21.1 | 4.07 | 1.70 | 2.9 | 69¼-47⅝ | 14.3 |

a Excludes net loss on facility disposal and asset write-down of $169,000. b Excludes net gain on disposal of facilities of $14.8 million ($0.34 per share). c Includes loss on sale of flavor compounding business, before taxes, of $890,000. d Excludes net gain on sale of Polychem department of $1.7 million ($0.93 per share). e Excludes net gain on sale of fragrance business of $528,000 ($0.28 per share). f Excludes cumulative effect of change in accounting principle for the investment tax credit of $217 million ($3.28 per share). g Includes net charge on sales and disposals of assets of $21.1 million. h Includes net gain on sales of European ethylene derivatives business and other businesses of $54.4 million. i From continuing operations; excludes net income from discontinued operations of $10.4 million ($0.35 per share). j From continuing operations; excludes net loss from discontinued operations of $16.7 million ($0.62 per share). k Includes net gain on sale of animal health business of $1.8 million ($0.02 per share). l Includes net gain on sale of blood products business of $3.3 million ($0.03 per share). m Includes net gain on sale of assets of $450,000. n Includes net gain on sale of enzyme facilities of $700,000.

# 2 Finances of the U.S. Chemical Industry

| Year | Net sales | Net income | Total assets | Current ratio | Net plant and equipment | Capital expenditures | Net worth | NET INCOME % of sales | NET INCOME % of net worth | NET INCOME $ per share | Dividends, $ per share | Dividend yield, % of price | Stock price range, $ per share | Price-earnings ratio |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Money figures in thousands of dollars unless otherwise indicated | | | | | | | | | | | | | |
| **Morton-Norwich Products** | | | | | | | | | | | | | | |
| 1981[a] | $957,584 | $53,010 | $664,939 | 2.0 | $279,132 | $55,206 | $350,630 | 5.5% | 15.1% | $3.90 | $1.49 | 4.6% | $38⅝–26⅛ | 8.3 |
| 1980[a] | 846,601 | 47,730 | 590,077 | 2.1 | 250,911 | 52,094 | 316,902 | 5.6 | 15.1 | 3.52 | 1.40 | 5.1 | 34–21¼ | 7.8 |
| 1979[a] | 731,984 | 46,088 | 566,039 | 2.6 | 223,224 | 48,593 | 297,777 | 6.3 | 15.5 | 3.40 | 1.26 | 4.2 | 34⅛–25¾ | 8.8 |
| 1978[a] | 656,733 | 36,938 | 504,465 | 3.2 | 195,337 | 29,139 | 272,027 | 5.6 | 13.6 | 2.85 | 1.11 | 3.8 | 34⅞–23½ | 10.2 |
| **Pfizer** | | | | | | | | | | | | | | |
| 1981 | $3,249,700 | $273,700[b] | $3,544,200 | 1.9 | $968,200 | $287,100 | $1,594,700 | 8.4% | 17.2% | $3.63[b] | $1.60 | 3.4% | $54⅞–40 | 13.1 |
| 1980 | 3,029,300 | 254,800 | 3,247,300 | 1.9 | 825,000 | 163,600 | 1,456,500 | 8.4 | 17.5 | 3.48 | 1.44 | 3.4 | 53¾–32 | 12.3 |
| 1979 | 2,746,025 | 237,869 | 2,945,280 | 2.0 | 759,269 | 133,300 | 1,310,074 | 8.7 | 18.2 | 3.26 | 1.32 | 3.7 | 41¾–29 | 10.9 |
| 1978 | 2,362,133 | 206,256 | 2,643,611 | 2.0 | 709,957 | 110,100 | 1,149,537 | 8.7 | 17.9 | 2.93 | 1.17 | 3.6 | 39–25½ | 11.0 |
| **Richardson-Vicks** | | | | | | | | | | | | | | |
| 1981[a] | $1,088,100 | $83,200[c] | $672,200 | 1.7 | $208,600 | $49,300 | $365,300 | 7.6% | 22.8% | $3.47[d] | $1.32 | 4.7% | $34¾–21¾ | 8.1 |
| 1980[a,d] | 1,211,651 | 84,209 | 829,551 | 2.0 | 242,568 | 52,630 | 427,938 | 6.9 | 19.7 | 3.56 | 1.20 | 4.3 | 38⅛–17½ | 7.8 |
| 1979[a,d] | 1,090,546 | 62,956 | 718,229 | 2.1 | 209,251 | 47,545 | 376,852 | 5.8 | 16.7 | 2.66 | 1.06 | 4.5 | 27–19¾ | 8.8 |
| 1978[a,d] | 944,961 | 66,179 | 631,801 | 2.0 | 192,413 | 29,681 | 333,005 | 7.0 | 19.9 | 2.80 | 0.90 | 3.5 | 31–19⅞ | 9.1 |
| **A. H. Robins Co.** | | | | | | | | | | | | | | |
| 1981 | $450,854 | $44,228[e] | $385,483 | 3.0 | $96,457 | $28,103 | $251,742 | 9.8% | 17.6% | $1.77[e] | $0.44 | 3.8% | $14¾–8½ | 6.6 |
| 1980 | 432,328 | 25,470[f] | 337,318 | 2.9 | 80,511 | 30,273 | 227,142 | 5.9 | 11.2 | 1.01[f] | 0.42 | 4.4 | 12½–6⅝ | 9.5 |
| 1979 | 386,425 | 44,746[g] | 329,072 | 2.8 | 59,994 | 16,687 | 222,148 | 11.6 | 20.1 | 1.71[g] | 0.40 | 4.0 | 12–8¼ | 5.9 |
| 1978 | 357,070 | 29,916 | 273,895 | 3.6 | 55,350 | 12,643 | 188,097 | 8.4 | 15.9 | 1.15 | 0.34 | 3.2 | 12⅞–8⅝ | 9.3 |
| **Schering-Plough Corp.** | | | | | | | | | | | | | | |
| 1981 | $1,808,800 | $179,300 | $2,214,500 | 1.9 | $654,600 | $170,300 | $1,254,200 | 9.9% | 14.3% | $3.31 | $1.66 | 4.9% | $42½–24⅞ | 10.2 |
| 1980 | 1,740,400 | 239,300 | 1,925,800 | 1.7 | 524,800 | 130,900 | 1,193,800 | 13.7 | 20.0 | 4.45 | 1.56 | 4.2 | 45⅝–29⅛ | 8.4 |
| 1979 | 1,434,022 | 222,267 | 1,534,245 | 2.0 | 415,401 | 68,316 | 1,037,354 | 15.5 | 21.4 | 4.12 | 1.39 | 4.4 | 35¼–27½ | 7.6 |
| 1978 | 1,082,493 | 183,629 | 1,183,919 | 2.7 | 319,551 | 51,336 | 848,558 | 17.9 | 22.8 | 3.62 | 1.21 | 3.8 | 38–26¼ | 8.9 |
| **G. D. Searle & Co.** | | | | | | | | | | | | | | |
| 1981 | $ 942,300 | $130,900[h] | $1,050,400 | 2.3 | $279,300 | $87,600 | $533,600 | 13.9% | 24.5% | $2.52[h] | $0.52 | 1.7% | $35½–25⅛ | 12.0 |
| 1980 | 1,081,558 | 94,341[i] | 1,089,928 | 1.4 | 249,695 | 66,961 | 508,844 | 8.7 | 18.5 | 1.78[i] | 0.52 | 2.3 | 27⅝–17¼ | 12.6 |
| 1979 | 898,369 | 89,004[j] | 1,099,383 | 1.9 | 212,972 | 49,253 | 456,358 | 9.9 | 19.5 | 1.68[j] | 0.52 | 3.3 | 20–11½ | 9.4 |
| 1978 | 848,380 | 72,187 | 964,962 | 3.1 | 179,710 | 40,413 | 414,983 | 8.5 | 17.4 | 1.37 | 0.52 | 3.8 | 16⅝–10⅝ | 9.9 |
| **SmithKline Beckman Corp.** | | | | | | | | | | | | | | |
| 1981 | $1,985,341 | $370,000 | $1,796,105 | 2.3 | $580,920 | $200,816 | $1,138,457 | 18.6% | 32.5% | $5.55 | $[illegible].2 | 2.8% | $88¾–63⅞ | 13.7 |
| 1980 | 1,771,938 | 307,994 | 1,490,914 | 2.4 | 421,788 | 132,806 | 923,723 | 17.4 | 33.3 | 4.65 | 1.725 | 2.8 | 80⅝–43½ | 13.3 |
| 1979 | 1,351,145 | 233,837 | 1,150,260 | 2.3 | 299,847 | 93,494 | 667,468 | 17.3 | 35.0 | 3.85 | 1.32 | 2.6 | 63¼–38½ | 13.2 |
| 1978 | 1,112,039 | 164,075 | 994,224 | 2.4 | 224,929 | 75,579 | 503,770 | 14.8 | 32.6 | 2.72 | 0.78 | 2.1 | 51¼–23⅛ | 13.6 |
| **Squibb Corp.** | | | | | | | | | | | | | | |
| 1981 | $1,523,911 | $ 41,098[k] | $1,900,424 | 2.1 | $479,720 | $69,851 | $979,689 | 2.7% | 4.2% | $0.83[k] | $1.215 | 3.8% | $37⅝–26⅝ | 38.7 |
| 1980 | 1,675,789 | 123,079[l] | 1,858,270 | 2.3 | 600,895 | 89,032 | 964,504 | 7.3 | 12.8 | 2.56[l] | 1.155 | 3.6 | 39¼–24⅜ | 12.4 |
| 1979 | 1,782,894 | 123,722 | 1,747,688 | 2.2 | 630,047 | 109,970 | 881,875 | 6.9 | 14.0 | 2.71 | 1.095 | 3.3 | 39¼–27 | 12.2 |
| 1978 | 1,515,882 | 117,255 | 1,541,165 | 2.2 | 559,090 | 108,046 | 793,219 | 7.7 | 14.8 | 2.60 | 1.035 | 3.5 | 37⅜–21⅜ | 11.3 |
| **Sterling Drug** | | | | | | | | | | | | | | |
| 1981 | $1,792,925 | $130,303 | $1,226,410 | 2.5 | $334,980 | $77,016 | $787,542 | 7.3% | 16.5% | $2.15 | $0.98 | 4.3% | $26⅛–19 | 10.5 |
| 1980 | 1,701,433 | 123,337 | 1,214,231 | 2.4 | 318,109 | 70,051 | 752,640 | 7.2 | 16.4 | 2.04 | 0.90 | 4.2 | 26⅞–16 | 10.5 |
| 1979 | 1,500,692 | 111,594 | 1,105,581 | 2.3 | 280,594 | 58,186 | 680,649 | 7.4 | 16.4 | 1.85 | 0.82 | 4.5 | 21⅜–15¼ | 9.9 |
| 1978 | 1,314,630 | 94,675 | 950,470 | 2.5 | 255,603 | 36,933 | 618,767 | 7.2 | 15.3 | 1.57 | 0.75 | 4.7 | 19¼–12¾ | 10.2 |
| **Upjohn Co.** | | | | | | | | | | | | | | |
| 1981 | $1,898,334 | $181,764 | $1,940,485 | 2.0 | $814,481 | $139,211 | $965,267 | 9.6% | 18.8% | $6.04 | $2.07 | 3.6% | $ 69–45⅝ | 9.5 |
| 1980 | 1,760,576 | 170,375 | 1,669,621 | 1.9 | 544,322 | 109,800 | 865,753 | 9.7 | 19.7 | 5.71 | 1.93 | 3.5 | 68–41½ | 9.6 |
| 1979 | 1,508,025 | 149,478 | 1,403,734 | 2.1 | 476,367 | 77,498 | 743,659 | 9.9 | 20.1 | 5.03 | 1.62 | 3.6 | 50½–40 | 9.0 |
| 1978 | 1,328,551 | 129,405 | 1,207,625 | 2.3 | 437,803 | 44,681 | 639,753 | 9.7 | 20.2 | 4.36 | 1.37 | 3.1 | 56–32⅛ | 10.1 |
| **Warner-Lambert Co.** | | | | | | | | | | | | | | |
| 1981 | $3,379,952 | $ 9,222[m] | $2,662,418 | 1.7 | $869,753 | $165,833 | $1,084,796 | 0.3% | 0.9% | $0.12[m] | $1.34 | 6.4% | $ 25–17⅛ | 175.5 |
| 1980 | 3,479,287 | 192,716[n] | 2,638,077 | 2.1 | 827,131 | 138,688 | 1,171,477 | 5.5 | 16.5 | 2.41[n] | 1.32 | 6.6 | 23¼–17 | 8.4 |
| 1979 | 3,217,208 | 123,346[o] | 2,542,167 | 1.9 | 775,253 | 155,473 | 1,067,151 | 3.8 | 11.6 | 1.55[o] | 1.29 | 5.8 | 26½–17⅜ | 14.3 |
| 1978 | 2,878,496 | 207,947 | 2,318,838 | 2.0 | 715,880 | 133,748 | 1,026,713 | 7.2 | 20.3 | 2.61 | 1.175 | 4.2 | 32½–22⅞ | 10.6 |

a Fiscal year ends June 30. b From continuing operations; excludes net loss from discontinued diagnostic imaging operations and provision for loss on disposal of discontinued operations of $52.4 million ($0.68 per share). c From continuing operations; excludes net loss from discontinued ethical pharmaceutical businesses of $3.9 million ($0.16 per share). d Data for Richardson-Merrell prior to sale (in March 1981) of ethical pharmaceutical businesses to Dow Chemical Co. e Includes income, before taxes, from litigation settlement of $3.4 million. f Includes income, before taxes, from litigation settlement of $3.6 million and provision for net losses on disposition of businesses of $4.7 million ($0.19 per share). g Includes income, before taxes, from settlement of antitrust litigation of $28.9 million. h From continuing operations; excludes net loss from operations and disposition of discontinued businesses of $26.0 million ($0.50 per share) and debit for cumulative effect of changes in accounting principles of $6.2 million ($0.12 per share). i From continuing operations; excludes reserve for loss from sale of assets of diagnostic business of $9.0 million ($0.17 per share) and extraordinary tax credit of $13.0 million ($0.24 per share). j From continuing operations; excludes net loss from operations of divested diagnostic business of $1.1 million ($0.02 per share). k From continuing operations; excludes net gain on sale of confectionery products business of $58.1 million ($1.16 per share), net income from that business of $12.2 million ($0.24 per share), and extraordinary charge relating to takeover of operations in Iran of $6.5 million ($0.13 per share). l From continuing operations; excludes net income of divested food services and related operations of $4.3 million ($0.09 per share). m Includes net nonrecurring charge of $134 million ($1.68 per share). n Includes net nonrecurring charge of $3 million ($0.03 per share). o Includes net nonrecurring charges and tax settlement of $64 million ($0.80 per share).

# Productivity makes slim gain as capacity use remains low

The U.S. chemical industry's productivity problems of the past decade continued in 1981, leading to another sizable increase in unit labor costs. A big contributor was low plant operating rates, which have become even worse in 1982.

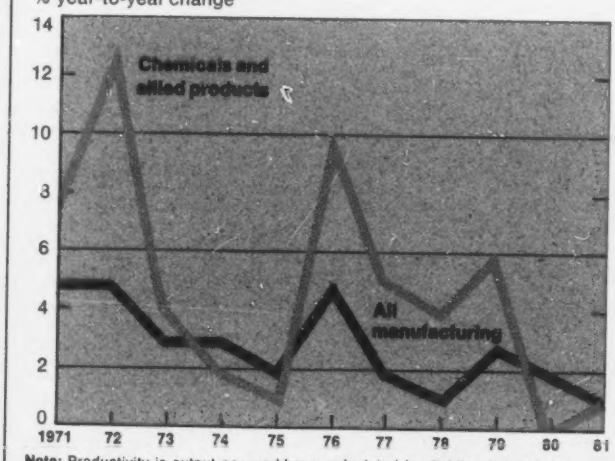
In 1981, the industry eked out a 1% increase in productivity (output per workhour) after no gain at all in 1980. Manufacturing as a whole did no better in 1981 and slightly outpaced chemicals in 1980. By contrast, average annual productivity gains over the past decade were 5% in chemicals and 3% in all manufacturing.

Since wages still went up briskly in 1981, unit labor costs climbed again, although not to the very high levels of 1980. The 1981 increase, 5% for both chemicals and all manufacturing, was about in line with decade averages of 4% in chemicals and 5% in all manufacturing.

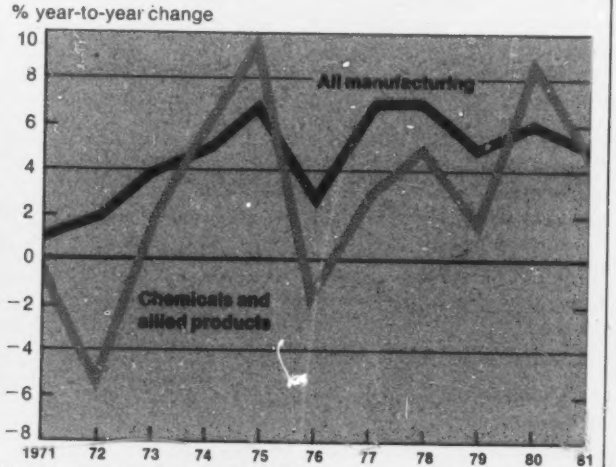
At the same time, output at U.S. plants of the leading chemicals measured by C&EN picked up to 74% of nameplate capacity in 1981 from 68% in third-quarter 1980. However, since then, plant use has plummeted to an even lower 62% in the first quarter of 1982.

Government measures of plant capacity use parallel C&EN's, although at slightly higher levels. For chemicals and allied products, year-end capacity use was 70% in 1981, cut from 78% in 1980 and 83% in the last good year, 1979. These rates are close to averages for all manufacturing, which was running at 72% of capacity as 1981 closed.

**Productivity gains remain low...**




**...while unit labor costs still rise**




**Note:** Productivity is output per workhour, calculated by dividing indexes for production by indexes for workhours of production employees. Unit labor costs are labor costs per unit of output, calculated by dividing indexes for wages by indexes for output per workhour. **Sources:** Department of Labor, Federal Reserve Board, C&EN calculations

## PRODUCTIVITY: Chemical industry rebounds slightly in 1981 after drop in 1980

| Indexes, 1967 = 100 | 1981 | 1980 | 1979 | 1978 | 1977 | 1976 | 1975 | 1974 | 1973 | 1972 | 1971 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CHEMICALS AND ALLIED PRODUCTS | | | | | | | | | | | |
| **Production** | 215.6 | 207.1 | 211.8 | 197.4 | 185.7 | 170.9 | 147.2 | 159.4 | 154.4 | 143.6 | 125.9 |
| **Workhours** | 108.8 | 105.4 | 107.7 | 106.8 | 104.5 | 101.4 | 96.5 | 105.1 | 103.7 | 100.3 | 99.2 |
| **Productivity** | 198.2 | 196.5 | 196.7 | 184.8 | 177.7 | 168.5 | 152.5 | 151.7 | 148.9 | 143.2 | 126.9 |
| **Hourly production wages** | 282.9 | 267.4 | 245.2 | 226.5 | 207.4 | 190.7 | 173.9 | 157.4 | 145.5 | 137.4 | 128.0 |
| **Unit labor costs** | 142.7 | 136.5 | 124.7 | 122.6 | 116.7 | 113.2 | 114.0 | 103.8 | 97.7 | 95.9 | 100.9 |
| ALL MANUFACTURING | | | | | | | | | | | |
| **Production** | 150.4 | 146.7 | 153.6 | 146.8 | 138.4 | 130.3 | 116.3 | 129.4 | 129.8 | 118.9 | 108.2 |
| **Workhours** | 98.3 | 96.4 | 103.4 | 101.8 | 97.3 | 93.4 | 87.8 | 100.0 | 103.1 | 97.3 | 93.1 |
| **Productivity** | 153.0 | 152.2 | 148.6 | 144.2 | 142.2 | 139.5 | 132.5 | 129.2 | 125.9 | 122.2 | 116.2 |
| **Hourly production wages** | 273.4 | 257.8 | 237.6 | 218.8 | 201.4 | 185.1 | 171.3 | 156.7 | 145.0 | 135.5 | 126.6 |
| **Unit labor costs** | 178.7 | 169.4 | 159.9 | 151.7 | 141.6 | 132.7 | 129.3 | 121.1 | 115.2 | 110.9 | 109.0 |

**Sources:** Department of Labor, Federal Reserve Board, C&EN calculations

# 3 Performance by the U.S. Chemical Industry

## OPERATING RATES: Use of chemical plant capacity is down sharply

| Billions of lb per year unless otherwise noted[a] | 1ST-QTR 1982 | | 3RD-QTR 1981 | | 1ST-QTR 1981 | | 3RD-QTR 1980 | | 1ST-QTR 1980 | | 3RD-QTR 1979 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Capacity[b] | Use | Capacity[b] | Use | Capacity[b] | Use | Capacity[b] | Use | Capacity[b] | Use | Capacity[b] | Use |
| **ORGANIC CHEMICALS** | | | | | | | | | | | | |
| **Benzene** (bg) | 2.7 | 39% | 2.7 | 67% | 2.5 | 68% | 2.4 | 64% | 2.6 | 70% | 2.3 | 77% |
| **Butadiene**[c] | 4.6 | 42 | 4.6 | 67 | 4.6 | 61 | 4.0 | 65 | 4.7 | 75 | 4.0 | 90 |
| **Cyclohexane** | 3.1 | 33 | 3.4 | 59 | 3.4 | 62 | 3.4 | 52 | 3.2 | 85 | 3.2 | 78 |
| **DMT-TPA**[d] | 7.3 | 58 | 7.3 | 71 | 7.3 | 71 | 7.3 | 59 | 7.3 | 75 | 7.3 | 68 |
| **Ethylene** | 39.7 | 56 | 41.0 | 65 | 40.0 | 68 | 40.0 | 63 | 37.0 | 84 | 36.5 | 89 |
| **Formaldehyde,** 37% solution | 8.9 | 51 | 8.9 | 65 | 8.9 | 66 | 8.6 | 59 | 8.5 | 72 | 8.5 | 79 |
| **Methanol** (bg) | 1.5 | 72 | 1.4 | 83 | 1.4 | 90 | 1.4 | 80 | 1.4 | 83 | 1.4 | 85 |
| **Phenol** | 4.0 | 56 | 4.0 | 67 | 3.6 | 69 | 3.7 | 65 | 3.6 | 81 | 3.4 | 82 |
| **Propylene,** chemical | 23.5 | 43 | 23.5 | 59 | 23.5 | 58 | 23.8 | 48 | 20.5 | 79 | 20.5 | 72 |
| **Styrene** | 8.7 | 79 | 8.9 | 74 | 8.9 | 82 | 8.9 | 55 | 9.3 | 87 | 8.4 | 89 |
| **Urea** | 8.1 | 63 | 8.0 | 90 | 8.0 | 88 | 8.0 | 91 | 7.7 | 86 | 7.5 | 87 |
| **Vinyl acetate** | 2.4 | 72 | 2.4 | 79 | 2.5 | 78 | 2.5 | 68 | 2.5 | 79 | 2.4 | 83 |
| **Vinyl chloride** | 9.6 | 50 | 9.7 | 70 | 9.2 | 65 | 8.2 | 63 | 8.7 | 89 | 8.4 | 99 |
| ***p*-Xylene** | 4.9 | 61 | 5.6 | 64 | 5.6 | 75 | 5.6 | 68 | 5.3 | 70 | 5.7 | 79 |
| **INORGANIC CHEMICALS** | | | | | | | | | | | | |
| **Ammonia** (mt) | 20.8 | 80 | 24.0 | 80 | 24.0 | 83 | 24.0 | 75 | 20.4 | 95 | 20.4 | 91 |
| **Carbon black** | 3.4 | 75 | 3.4 | 82 | 3.7 | 76 | 3.7 | 61 | 3.8 | 68 | 4.3 | 73 |
| **Carbon dioxide** (ttd) | 17.7 | 63 | 16.4 | 71 | 15.6 | 69 | 15.6 | 68 | 14.1 | 69 | 12.5 | 52 |
| **Caustic soda** (mt) | 15.6 | 59 | 15.5 | 75 | 15.6 | 73 | 15.3 | 68 | 15.5 | 79 | 15.1 | 85 |
| **Chlorine** (mt) | 14.7 | 62 | 14.8 | 78 | 14.7 | 73 | 14.6 | 69 | 14.4 | 84 | 14.4 | 88 |
| **Nitrogen**, **Oxygen** } total, liquid (ttd) | 37.6 | 64 | 36.0 | 66 | 34.8 | 63 | 33.6 | 69 | 32.4 | 68 | 31.2 | 67 |
| **Phosphoric acid,** ($P_2O_5$) (mt) | 12.4 | 62 | 11.5 | 91 | 11.7 | 94 | 11.7 | 87 | 11.0 | 94 | 9.8 | 94 |
| **Phosphorus** (mt) | 0.55 | 66 | 0.55 | 78 | 0.55 | 78 | 0.55 | 70 | 0.55 | 83 | 0.55 | 78 |
| **Soda ash** (mt) | 10.4 | 76 | 10.0 | 83 | 10.0 | 82 | 9.7 | 79 | 9.7 | 85 | 9.1 | 92 |
| **Sulfuric acid** (mt) | 59.4 | 54 | 58.5 | 74 | 58.3 | 74 | 58.0 | 76 | 57.5 | 76 | 56.0 | 81 |
| **Titanium dioxide** (mt) | 1.0 | 53 | 1.0 | 82 | 1.0 | 77 | 1.0 | 66 | 1.0 | 75 | 0.88 | 88 |
| **AVERAGE** | | 62% | | 74% | | 74% | | 68% | | 80% | | 82% |

a bg= billions of gallons, mt = millions of tons, ttd = thousands of tons per day. b Nameplate capacity. c Based on extraction capacity of steam-cracking olefins plants, dehydrogenation and extraction capacity of dehydrogenation plants, and other butadiene recovery capacity. d Dimethyl terephthalate-purified terephthalic acid, not including acid converted to dimethyl terephthalate.
**Sources:** Industry sources, C&EN estimates

## Surplus capacity ballooned in chemical process industries last year

| | Operating rate, % of nameplate capacity, as of December | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1981 | 1980 | 1979 | 1978 | 1977 | 1976 | 1975 | 1974 | 1973 | 1972 | 1971 |
| **Chemicals** | 70% | 78% | 83% | 83% | 76% | 78% | 78% | 81% | 88% | 85% | 81% |
| **Paper** | 83 | 89 | 91 | 89 | 87 | 85 | 85 | 84 | 93 | 91 | 87 |
| **Petroleum** | 73 | 80 | 86 | 91 | 91 | 93 | 91 | 90 | 95 | 94 | 93 |
| **Rubber** | 66 | 70 | 70 | 84 | 81 | 85 | 81 | 77 | 84 | 89 | 86 |
| **Textiles** | 75 | 80 | 82 | 85 | 87 | 84 | 85 | 69 | 89 | 91 | 86 |
| **All manufacturing** | 72 | 78 | 81 | 84 | 82 | 81 | 79 | 78 | 85 | 85 | 80 |

**Source:** Department of Commerce

## ENERGY USE BY CHEMICAL INDUSTRY: Gas, oil, steam drop; electricity rises

| Energy source[a] | 1981 Trillion Btu | 1981 % of total | 1980 Trillion Btu | 1980 % of total | 1979 Trillion Btu | 1979 % of total | 1978 Trillion Btu | 1978 % of total | 1972 Trillion Btu | 1972 % of total | Change 1972–81 Trillion Btu | Change 1972–81 % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Natural gas** | 1264 | 40.2% | 1293 | 39.7% | 1371 | 38.6% | 1237 | 37.1% | 1671 | 47.2% | −407 | −24.4% |
| **Purchased electricity[b]** | 928 | 29.5 | 943 | 29.0 | 998 | 28.1 | 876 | 26.3 | 771 | 21.8 | 157 | 20.4 |
| **Petroleum-based fuels** | 542 | 17.2 | 621 | 19.1 | 762 | 21.5 | 800 | 24.0 | 644 | 18.2 | −102 | −15.8 |
| Light hydrocarbons[c] | 351 | 11.1 | 380 | 11.7 | 433 | 12.2 | 370 | 11.1 | 363 | 10.3 | −12 | −3.3 |
| Residual fuels | 104 | 3.3 | 141 | 4.3 | 217 | 6.1 | 269 | 8.1 | 179 | 5.0 | −75 | −41.9 |
| Distillate fuels | 18 | 0.6 | 23 | 0.7 | 37 | 1.0 | 64 | 1.9 | 33 | 0.9 | −15 | −45.5 |
| Other fuel[d] | 70 | 2.2 | 77 | 2.4 | 75 | 2.1 | 98 | 2.9 | 69 | 1.9 | 1 | 1.4 |
| **Coal and coke** | 314 | 10.0 | 301 | 9.3 | 305 | 8.6 | 305 | 9.1 | 328 | 9.3 | −14 | −4.3 |
| **Purchased steam** | 98 | 3.1 | 95 | 2.9 | 115 | 3.2 | 117 | 3.5 | 127 | 3.6 | −29 | −22.8 |
| **TOTAL** | 3147 | 100.0% | 3255 | 100.0% | 3550 | 100.0% | 3335 | 100.0% | 3542 | 100.1% | −395 | −11.2% |

a For energy and process use only, excluding energy equivalent of feedstock. b Electricity is calculated as fuel value of 10,000 Btu to generate 1 kWh instead of using standard conversion factor of 3412 Btu per kWh. c Includes propane, liquefied petroleum gas, and other gases. d Includes petroleum coke, gasoline, and other liquids and solids. **Note:** Data from companies accounting for about 90% of U.S. capacity for basic industrial chemicals. **Source:** Chemical Manufacturers Association

## ENERGY USE BY FERTILIZER INDUSTRY: Gas's big share gets even bigger

| Energy source[a] | 1981 Trillion Btu | 1981 % of total | 1980 Trillion Btu | 1980 % of total | 1979[b] Trillion Btu | 1979[b] % of total | 1972 Trillion Btu | 1972 % of total | Change 1972–81 Trillion Btu | Change 1972–81 % |
|---|---|---|---|---|---|---|---|---|---|---|
| **Natural gas** | 200.6 | 81.2% | 205.0 | 79.3% | 206.1 | 77.9% | 161.5 | 79.2% | 39.1 | 24.2% |
| **Purchased electricity[c]** | 43.7 | 17.7 | 46.9 | 18.2 | 49.2 | 18.6 | 35.5 | 17.4 | 8.2 | 23.1 |
| **Petroleum-based fuels** | 1.8 | 0.7 | 5.8 | 2.2 | 8.6 | 3.3 | 6.3 | 3.1 | −4.5 | −71.4 |
| Light hydrocarbons[d] | 0 | 0 | 0.4 | 0.2 | 0.4 | 0.1 | 0.1 | 0 | −0.1 | −100.0 |
| Residual fuels | 1.0 | 0.4 | 4.5 | 1.7 | 5.4 | 2.0 | 3.8 | 1.9 | −2.8 | −73.7 |
| Distillate fuels | 0.7 | 0.3 | 0.7 | 0.3 | 2.7 | 1.0 | 2.2 | 1.1 | −1.5 | −68.2 |
| Other fuel[e] | 0.1 | 0.1 | 0.2 | 0.1 | 0.2 | 0.1 | 0.1 | 0.1 | 0 | 0 |
| **Coal and coke** | 0.5 | 0.2 | 0.6 | 0.2 | 0.5 | 0.2 | 0.5 | 0.2 | 0 | 0 |
| **Purchased steam** | 0.4 | 0.1 | 0.2 | 0.1 | 0.2 | 0.1 | 0.1 | 0 | 0.3 | 300.0 |
| **TOTAL** | 246.9 | 99.9% | 258.5 | 100.0% | 264.6 | 100.1% | 203.8 | 99.9% | 43.1 | 21.1% |

a For energy and process use only, excluding energy equivalent of feedstock. b Figures for 1979 include 18 companies (with total energy consumption of 209 trillion Btu) that use 1972 as a reference base and four companies (with total energy consumption of 56 trillion Btu) that use 1978 as a reference base instead; 1979 figures thus are not completely comparable to other years. c Electricity is calculated as fuel value of 10,000 Btu to generate 1 kWh instead of using standard conversion factor of 3412 Btu per kWh. d Includes propane and liquefied petroleum gas. e Includes gasoline, diesel oil, kerosene, and other fuels. **Note:** Data from companies accounting for more than 70% of U.S. fertilizer capacity. **Source:** Fertilizer Institute

## ENERGY USE BY PETROLEUM INDUSTRY: Electricity's share is small but growing

| Energy source[a] | 1981 Trillion Btu | 1981 % of total | 1980 Trillion Btu | 1980 % of total | 1979 Trillion Btu | 1979 % of total | 1978 Trillion Btu | 1978 % of total | 1972 Trillion Btu | 1972 % of total | Change 1972–81 Trillion Btu | Change 1972–81 % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Natural gas** | 685 | 24.7% | 734 | 25.1% | 758 | 25.0% | 676 | 22.6% | 1033 | 33.6% | −348 | −33.7% |
| **Purchased electricity[b]** | 250 | 9.0 | 253 | 8.6 | 242 | 8.0 | 231 | 7.7 | 201 | 6.5 | 49 | 24.4 |
| **Petroleum-based fuels** | 1809 | 65.1 | 1903 | 65.1 | 1989 | 65.7 | 2050 | 68.4 | 1796 | 58.5 | 13 | 0.7 |
| Light hydrocarbons[c] | 1193 | 43.0 | 1243 | 42.5 | 1291 | 42.7 | 1287 | 42.9 | 1067 | 34.8 | 126 | 11.8 |
| Residual fuels | 177 | 6.4 | 215 | 7.3 | 234 | 7.7 | 306 | 10.2 | 258 | 8.4 | −81 | −31.4 |
| Petroleum coke | 428 | 15.4 | 425 | 14.5 | 431 | 14.3 | 422 | 14.1 | 442 | 14.4 | −14 | −3.2 |
| Other fuel[d] | 11 | 0.4 | 19 | 0.7 | 33 | 1.1 | 35 | 1.2 | 29 | 0.9 | −18 | −62.1 |
| **Coal and coke** | 5 | 0.2 | 4 | 0.1 | 5 | 0.2 | 3 | 0.1 | 5 | 0.2 | 0 | 0 |
| **Purchased steam** | 28 | 1.0 | 31 | 1.1 | 32 | 1.1 | 38 | 1.3 | 37 | 1.2 | −9 | −24.3 |
| **TOTAL** | 2777 | 100.0% | 2925 | 100.0% | 3026 | 100.0% | 2998 | 100.1% | 3071 | 100.0% | −294 | −9.6% |

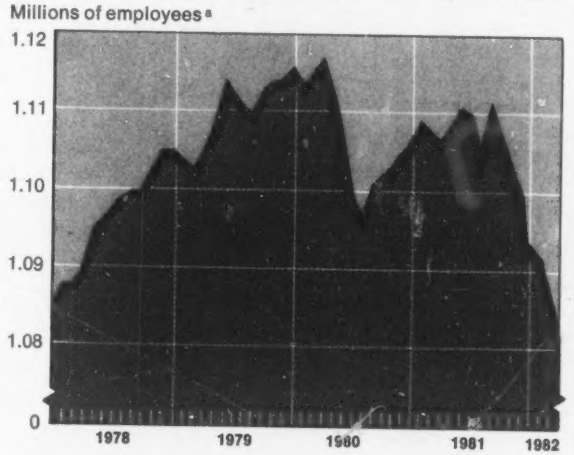
a For energy and process use only, excluding energy equivalent of feedstock. b Electricity is calculated as fuel value of 10,000 Btu to generate 1 kWh instead of using standard conversion factor of 3412 Btu per kWh. c Includes propane, liquefied petroleum gas, and refinery gas. d Includes distillate fuels, gasoline, and other liquids. **Note:** Data from companies accounting for more than 90% of U.S. petroleum refining capacity. **Source:** American Petroleum Institute

# Chemical jobs recover then turn down again

The U.S. chemical industry has not been hit by the massive job layoffs that have plagued many other segments of industry, such as automobiles, steel, farm machinery, and construction, during the past 12 months. But employment clearly has been trending downward in the industry since the end of last summer, when the number of workers making chemicals peaked at a level several thousand lower than that reached before the 1980 recession.

Chemical employment has slumped about 30,000 (3%) since last summer, to a total less than that during the bottom of the 1980 recession and, in fact, lower than at any time since late 1977. However, layoffs have not been so severe as during the 1975 recession, when employment declined close to 70,000 over a 10-month period. As in the past, most of the layoffs have been among production or other nonsupervisory workers, for whom employment is at the lowest level since 1976.

**Months of declining employment bring jobs in chemical industry to four-year low**




a Seasonally adjusted employment in U.S. chemicals and allied products industry. **Source:** Department of Labor

## INDUSTRIAL EMPLOYMENT: No change last year in the chemical industry

| | All employees[a] (thousands) | | | | Production workers[a] (thousands) | | | | Workweek[a,b] (hours) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1981 | 1980 | 1979 | 1971 | 1981 | 1980 | 1979 | 1971 | 1981 | 1980 | 1979 | 1971 |
| **All manufacturing** | 20,261 | 20,300 | 21,040 | 18,623 | 14,083 | 14,223 | 15,068 | 13,544 | 39.8 | 39.7 | 40.2 | 39.9 |
| **Chemicals and allied products** | 1,107 | 1,107 | 1,109 | 1,011 | 626 | 626 | 633 | 588 | 41.6 | 41.5 | 41.9 | 41.6 |
| Industrial inorganic chemicals | 163 | 162 | 162 | na | 89 | 88 | 88 | na | 41.5 | 41.5 | 42.1 | na |
| Plastics materials and synthetics | 200 | 206 | 212 | 226 | 132 | 137 | 144 | 143 | 42.0 | 41.4 | 42.1 | 42.1 |
| Drugs | 201 | 197 | 192 | 156 | 100 | 97 | 96 | 78 | 41.1 | 41.0 | 41.1 | 40.6 |
| Soap, cleaners, and toilet goods | 139 | 139 | 140 | 122 | 87 | 84 | 84 | 69 | 40.4 | 40.4 | 40.5 | 40.8 |
| Paints and allied products | 64 | 65 | 69 | 68 | 32 | 33 | 36 | 37 | 40.4 | 40.3 | 41.2 | 40.7 |
| Industrial organic chemicals | 171 | 171 | 171 | na | 86 | 87 | 89 | na | 42.8 | 42.8 | 43.4 | na |
| Agricultural chemicals | 73 | 73 | 70 | na | 46 | 46 | 45 | na | 43.0 | 43.4 | 42.9 | na |
| Miscellaneous chemical products | 96 | 94 | 93 | na | 55 | 53 | 52 | na | 41.3 | 41.0 | 41.5 | na |
| **Petroleum and coal products** | 211 | 197 | 210 | 194 | 132 | 124 | 137 | 124 | 43.2 | 41.8 | 43.8 | 42.8 |
| **Rubber and miscellaneous plastics products** | 744 | 731 | 82 | 580 | 574 | 562 | 612 | 450 | 40.4 | 40.1 | 40.5 | 40.3 |

a Domestic employment. b Workweek of production or nonsupervisory workers. na = not available. **Source:** Department of Labor

## EMPLOYMENT OF SCIENTISTS, ENGINEERS: Edges up to a new high in chemicals

| Thousands[a] | 1981[b] | 1980 | 1979 | 1978 | 1977 | 1976 | 1975 | 1974 | 1973 | 1972 | 1971 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Total, all industry** | 470.2 | 446.6 | 423.2 | 403.7 | 382.8 | 364.4 | 363.3 | 360.0 | 357.7 | 350.2 | 367.0 |
| **Chemicals and allied products** | 52.8 | 50.0 | 49.1 | 47.9 | 46.4 | 44.4 | 45.2 | 41.8 | 40.9 | 41.0 | 42.7 |
| Industrial chemicals | 22.1 | 21.3 | 21.6 | 21.5 | 20.6 | 20.1 | 21.1 | 19.1 | 19.1 | 19.1 | 21.8 |
| Drugs and medicines | 21.1 | 20.0 | 19.7 | 18.9 | 17.8 | 16.6 | 15.6 | 14.0 | 13.0 | 13.1 | 12.3 |
| Other chemicals | 9.6 | 8.7 | 7.8 | 7.4 | 8.0 | 7.8 | 8.5 | 8.7 | 8.8 | 8.8 | 8.6 |
| **Petroleum refining** | 13.4 | 11.0 | 10.3 | 10.0 | 8.9 | 8.6 | 8.4 | 8.2 | 8.2 | 8.3 | 9.2 |
| **Rubber products** | na | na | 8.1 | 7.9 | 9.1 | 8.6 | 8.4 | 7.7 | 7.5 | 6.7 | 6.7 |

a Full-time-equivalent number of R&D scientists and engineers in industry, as of January of each year. b Preliminary. na = not available. **Source:** National Science Foundation

# 4 Employment in the U.S. Chemical Industry

## CHEMICAL EMPLOYMENT: Little change in totals during past two years

| Thousands | Worldwide employment | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1981 | 1980 | 1979 | 1978 | 1977 | 1976 | 1975 | 1974 | 1973 | 1972 |
| **Air Products** | 16.2 | 15.8 | 14.6 | 14.3 | 13.7 | 13.4 | 13.0 | 13.0 | 10.3 | 9.0 |
| **Akzona** | 15.5 | 15.9 | 15.4 | 15.3 | 15.6 | 15.6 | 15.8 | 19.5 | 19.6 | 17.7 |
| **Allied** | 58.2 | 46.3 | 49.0 | 32.0 | 32.8 | 33.4 | 33.4 | 32.2 | 33.5 | 32.7 |
| **American Cyanamid** | 41.8 | 42.6 | 44.2 | 44.0 | 43.8 | 39.4 | 37.8 | 38.0 | 39.5 | 41.4 |
| **Celanese** | 35.9 | 36.5 | 33.3 | 33.2 | 32.1 | 31.9 | 37.0 | 38.8 | 37.4 | 36.2 |
| **Crompton & Knowles** | 2.5 | 2.8 | 3.0 | 3.2 | 3.1 | 3.0 | 2.2 | 2.4 | 2.5 | 2.6 |
| **Dow Chemical** | 63.8 | 56.8 | 55.9 | 53.5 | 53.2 | 53.0 | 53.0 | 53.3 | 49.8 | 48.8 |
| **Ethyl** | 14.5 | 15.0 | 16.0 | 16.5 | 16.0 | 16.0 | 17.0 | 18.0 | 14.0 | 14.0 |
| **FMC** | 38.9 | 39.0 | 41.0 | 40.4 | 37.9 | 33.2 | 33.2 | 34.1 | 31.7 | 28.9 |
| **Freeport-McMoRan** | 5.2 | 2.7 | 3.9 | 3.5 | 3.7 | 3.8 | 3.5 | 3.3 | 2.9 | 2.3 |
| **H. B. Fuller** | 3.3 | 3.4 | 3.4 | 3.3 | 3.0 | 2.8 | 2.6 | 2.3 | 2.1 | 1.8 |
| **W. R. Grace** | 88.8 | 91.7 | 82.1 | 68.5 | 68.7 | 63.8 | 65.3 | 79.1 | 75.7 | 73.9 |
| **Hercules** | 22.8 | 22.9 | 24.4 | 24.5 | 24.0 | 24.0 | 23.5 | 25.3 | 24.1 | 22.4 |
| **International Flavors** | 3.6 | 3.6 | 3.6 | 3.5 | 3.3 | 3.1 | 2.9 | 3.1 | 2.8 | 2.7 |
| **International Minerals** | 10.6 | 10.6 | 10.3 | 9.9 | 9.9 | 9.7 | 10.5 | 6.6 | 6.2 | 6.2 |
| **Lubrizol** | 4.2 | 4.2 | 3.9 | 3.8 | 3.6 | 3.6 | 3.6 | 3.5 | 3.3 | 3.0 |
| **Monsanto** | 57.4 | 61.8 | 63.9 | 62.9 | 61.5 | 61.9 | 59.2 | 60.9 | 58.3 | 57.9 |
| **Nalco Chemical** | 4.7 | 4.4 | 4.1 | 4.1 | 4.2 | 3.8 | 3.5 | 3.4 | 3.2 | 2.9 |
| **Olin** | 20.3 | 21.0 | 21.7 | 22.7 | 22.4 | 22.0 | 23.0 | 23.0 | 24.0 | 32.0 |
| **Pennwalt** | 10.7 | 12.8 | 13.3 | 14.0 | 13.9 | 13.9 | 14.3 | 14.8 | 13.9 | 12.8 |
| **Reichhold Chemicals** | 5.6 | 5.6 | 6.4 | 6.5 | 6.5 | 5.8 | 4.3 | 4.1 | 4.3 | 3.4 |
| **Rohm & Haas** | 13.5 | 13.2 | 13.3 | 13.1 | 13.0 | 13.3 | 13.8 | 14.2 | 13.5 | 13.1 |
| **Stauffer Chemical** | 12.2 | 13.4 | 13.8 | 13.1 | 13.0 | 13.0 | 13.1 | 12.5 | 12.0 | 11.3 |
| **Stepan Chemical** | 0.9 | 0.8 | 0.9 | 0.8 | 0.8 | 0.7 | 0.7 | 0.8 | 0.7 | 0.6 |
| **Union Carbide** | 110.3 | 116.1 | 115.8 | 113.4 | 113.7 | 113.1 | 106.5 | 109.6 | 109.4 | 98.1 |
| **TOTAL EMPLOYEES** | **661.4** | **658.9** | **659.2** | **624.1** | **613.4** | **597.6** | **592.9** | **615.8** | **594.8** | **583.5** |
| **ANNUAL CHANGE** | **0.4%** | **0.3%** | **5.3%** | **1.7%** | **2.6%** | **0.8%** | **−3.7%** | **3.5%** | **1.9%** | **2.0%** |
| **SALES PER EMPLOYEE** ($ thousands) | **$109.7** | **$103.5** | **$93.7** | **$89.2** | **$73.6** | **$68.5** | **$52.0** | **$57.3** | **$44.4** | **$34.5** |

**Note:** Data for years prior to 1980 are not restated for acquisitions and similar adjustments.

## WAGES: Better than average throughout the chemical industry

| | Hourly earnings[a] | | | | Weekly earnings[a] | | | |
|---|---|---|---|---|---|---|---|---|
| | 1981 | 1980 | 1979 | 1971 | 1981 | 1980 | 1979 | 1971 |
| **All manufacturing** | $ 7.98 | $ 7.27 | $6.70 | $3.57 | $317.60 | $288.62 | $269.34 | $142.44 |
| **Chemicals and allied products** | 9.12 | 8.30 | 7.60 | 3.97 | 379.39 | 344.45 | 318.44 | 165.15 |
| Industrial inorganic chemicals | 10.17 | 9.08 | 8.26 | na | 422.06 | 376.82 | 347.75 | na |
| Plastics materials and synthetics | 9.03 | 8.21 | 7.48 | 3.84 | 379.26 | 339.89 | 314.91 | 161.66 |
| Drugs | 8.32 | 7.70 | 6.93 | 3.81 | 341.95 | 315.70 | 284.82 | 154.69 |
| Soap, cleaners, and toilet goods | 8.33 | 7.65 | 7.18 | 3.90 | 336.53 | 309.06 | 290.79 | 159.12 |
| Paints and allied products | 8.06 | 7.40 | 6.80 | 3.68 | 325.62 | 298.22 | 280.16 | 149.78 |
| Industrial organic chemicals | 10.72 | 9.67 | 9.02 | na | 458.82 | 413.88 | 391.47 | na |
| Agricultural chemicals | 8.89 | 8.12 | 7.26 | na | 382.27 | 352.41 | 311.45 | na |
| Miscellaneous chemical products | 8.47 | 7.76 | 7.06 | na | 349.81 | 318.16 | 292.99 | na |
| **Petroleum and coal products** | 11.37 | 10.09 | 9.36 | 4.57 | 491.18 | 421.76 | 409.97 | 195.60 |
| **Rubber and miscellaneous plastics products** | 7.25 | 6.56 | 5.97 | 3.39 | 292.90 | 263.06 | 241.79 | 136.62 |

a For production and nonsupervisory workers in domestic employment. **na** = not available. **Source:** Department of Labor

# U.S. chemical trade surplus begins to narrow

World trade in chemicals declined last year to an estimated $124 billion from 1980's $139 billion.

That in itself may not be significant. But it has happened only once before in the past 20 years. That was in 1975, when the world's industrialized economies were suffering the shocks of the first oil crisis.

Last year, the economies of the major industrialized countries were again far from healthy. As a result, demand for chemical imports was down. Some countries made a conscious effort to shave imports in order to save jobs and prevent already-high trade deficits from becoming higher.

Under these circumstances, it was perhaps inevitable that world chemical trade would decline. When the worldwide economic situation improves, chemical trade no doubt will accelerate again.

What happened to U.S. chemical trade last year, however, certainly is significant. Chemical exports increased, but only 2.2% to $21 billion. That's a far cry from the 20% and 37% gains of the previous two years.

Meanwhile, U.S. chemical imports rose almost 10% to $9.4 billion, which lowered the chemical industry's cherished trade surplus from $12.1 billion to $11.7 billion. That is the first decline since 1972, and chemical industry trade experts fear that it may be a harbinger of things to come.

True, U.S. chemical exports suffered last year from weak international demand and a strong dollar, which made prices of U.S. products less competitive abroad. But trade experts see a more fundamental reason for last year's slow growth in chemical exports. It took place right after the government removed price controls on crude oil. That, they reason, erased some of the advantages in feedstock prices that U.S. producers enjoyed. If and when controls are removed from natural gas, the U.S. feedstock advantage will disappear entirely.

Meanwhile, plants now going up in countries rich in hydrocarbons figure to add a new dimension of competition to international chemical trade, starting as early as 1985. As a result, some experts believe that huge U.S. chemical trade surpluses soon may become a thing of the past.

## U.S. TOTAL TRADE BALANCE:

### Deficit widened by $3 billion last year

| $ Millions | 1981 | 1980 | 1979 | 1971 |
|---|---|---|---|---|
| Exports[a] | $233,677 | $220,626 | $181,639 | $43,549 |
| Imports[b] | 260,982 | 244,871 | 206,327 | 45,563 |
| Trade balance | −27,305 | −24,245 | −24,688 | −2,014 |

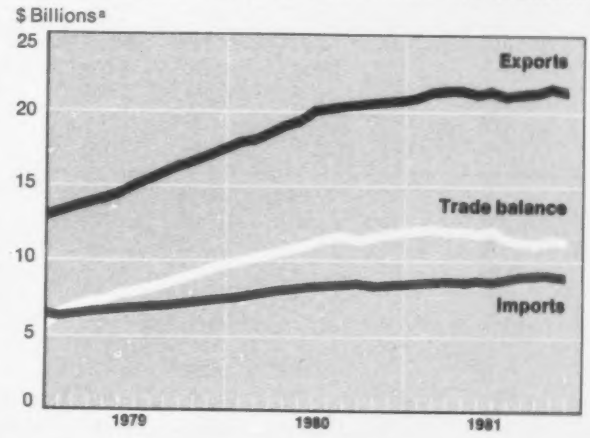
a Exports of domestic and foreign merchandise, excluding Department of Defense and Grant-Aid shipments; FAS (free along ship) value. b General imports; starting with 1974 reported as FAS value, prior to 1974 reported as foreign value, which is within 1% of FAS value. c Exports of domestic merchandise, including Department of Defense and Grant-Aid shipments. **Source:** Department of Commerce

## U.S. CHEMICAL TRADE BALANCE:

### Surplus down in 1981 for first time in years

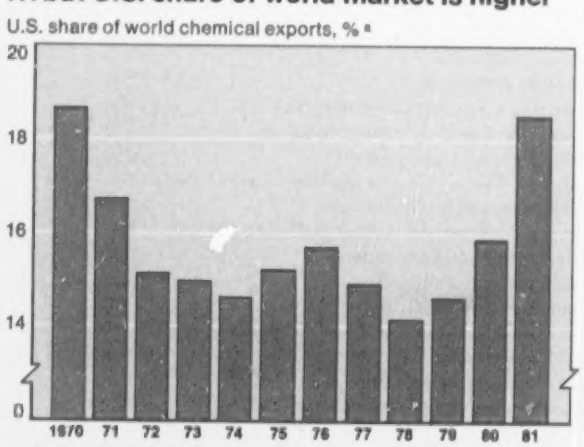
| $ Millions | 1981 | 1980 | 1979 | 1978 |
|---|---|---|---|---|
| Chemical exports[c] | $21,187 | $20,740 | $17,306 | $3,837 |
| Chemical imports[b] | 9,446 | 8,594 | 7,485 | 1,612 |
| Chemical trade balance | 11,741 | 12,146 | 9,821 | 2,225 |

### U.S. chemical trade balance narrows a bit...




a Running 12-month values for U.S. chemical exports, imports, and trade balance. **Source:** Department of Commerce

### ...but U.S. share of world market is higher




a U.S. exports as a percentage of world chemical exports less U.S. imports. **Source:** C&EN estimates based on Department of Commerce and United Nations data

## WORLD TRADE: U.S. tops West Germany

| $ Millions | 1981 | 1980 | 1979 | 1978 |
|---|---|---|---|---|
| CHEMICAL EXPORTS | | | | |
| **World** | $124,000[a] | $139,100[a] | $125,684 | $24,408 |
| **U.S.** | 21,187 | 20,740 | 17,306 | 3,837 |
| **Canada** | 4,012 | 3,519 | 2,897 | 593 |
| **EC, nine countries[b]** | 64,002 | 76,348 | 69,225 | 12,929 |
| Belgium-Luxembourg | 5,870 | 7,422 | 6,644 | 1,179 |
| France | 10,241 | 13,249 | 11,646 | 1,960 |
| Italy | 4,727 | 5,505 | 5,810 | 1,050 |
| Netherlands | 9,085 | 11,288 | 10,325 | 1,768 |
| U.K. | 12,300 | 12,303 | 10,451 | 2,155 |
| West Germany | 19,701 | 24,318 | 22,415 | 4,538 |
| **Switzerland** | 5,506 | 5,680 | 5,354 | 1,220 |
| **Japan** | 6,841 | 6,767 | 6,100 | 1,488 |
| CHEMICAL IMPORTS | | | | |
| **U.S.** | 9,446 | 8,594 | 7,485 | 1,612 |
| **Canada** | 3,691 | 3,249 | 3,076 | 830 |
| **EC, nine countries[b]** | 50,931 | 56,174 | 50,562 | 9,277 |
| Belgium-Luxembourg | 5,209 | 5,972 | 5,376 | 983 |
| France | 10,366 | 12,169 | 9,890 | 1,786 |
| Italy | 7,057 | 7,993 | 6,992 | 1,231 |
| Netherlands | 5,655 | 6,394 | 5,760 | 1,131 |
| U.K. | 7,900 | 7,310 | 7,232 | 1,385 |
| West Germany | 11,970 | 13,314 | 12,399 | 2,177 |
| **Switzerland** | 3,240 | 3,648 | 3,156 | 730 |
| **Japan** | 6,487 | 6,202 | 5,178 | 998 |

a C&EN estimates. b European Communities; historical data have been adjusted to reflect nine countries that were members during 1980 but exclude Greece, which joined in 1981.
**Sources:** United Nations, Organization of Economic Cooperation & Development, European Communities, individual country data

## U.S. TRADE: Biggest customers take less

| $ Millions | 1981 | 1980 | 1979 | 1978 |
|---|---|---|---|---|
| U.S. CHEMICAL EXPORTS | | | | |
| **Canada** | $ 2,478 | $ 2,134 | $ 1,994 | $ 593 |
| **Western Europe** | 6,251 | 6,429 | 5,585 | 1392 |
| **Eastern Europe** | 347 | 88 | 200 | 48 |
| **Communist Asia** | 405 | 386 | 125 | — |
| **Japan** | 2,349 | 1,964 | 1,652 | 324 |
| **Rest of Asia** | 2,598 | 2,782 | 2,204 | 300 |
| **Middle East** | 517 | 459 | 387 | 72 |
| **Latin America** | 4,469 | 4,846 | 3,814 | 746 |
| **Australasia** | 778 | 645 | 608 | 121 |
| **Africa** | 642 | 721 | 465 | 125 |
| **Other** | 353 | 286 | 272 | 116 |
| **TOTAL** | **$21,187** | **$20,740** | **$17,306** | **$3837** |
| U.S. CHEMICAL IMPORTS | | | | |
| **Canada** | $2196 | $2494 | $2362 | $ 397 |
| **Western Europe** | 3930 | 3953 | 3449 | 709 |
| **Eastern Europe** | 131 | 195 | 107 | 9 |
| **Communist Asia** | 126 | 107 | 60 | — |
| **Japan** | 956 | 697 | 616 | 196 |
| **Rest of Asia** | 197 | 163 | 148 | 18 |
| **Middle East** | 110 | 58 | 48 | 7 |
| **Latin America** | 669 | 536 | 405 | 69 |
| **Australasia** | 186 | 206 | 158 | 90 |
| **Africa** | 117 | 62 | 49 | 14 |
| **Other** | 828 | 112 | 83 | 103 |
| **TOTAL** | **$9446** | **$8583** | **$7485** | **$1612** |

**Source:** Department of Commerce

## U.S. TRADE, BY PRODUCTS: Exports of fertilizers and plastics ease

| $ Millions | Chemical exports[a] 1981[c] | 1980[c] | 1979[c] | 1971 | Chemical imports[b] 1981[c] | 1980[c] | 1979[c] | 1971 |
|---|---|---|---|---|---|---|---|---|
| **Organic chemicals** | $ 5,929 | $ 5,697 | $ 5,055 | $1021 | $2974 | $2539 | $2159 | $407 |
| **Inorganic chemicals** | 2,286 | 2,106 | 1,712 | 423 | 1573 | 1323 | 1106 | 355 |
| **Radioactive and associated materials** | 988 | 833 | 937 | 236 | 786 | 989 | 953 | 73 |
| **Dyeing, tanning, and coloring materials** | 175 | 186 | 177 | 49 | 226 | 194 | 185 | 105 |
| **Pigments, paints, and varnishes** | 349 | 304 | 273 | 91 | 102 | 89 | 76 | 10 |
| **Medicinals and pharmaceuticals** | 2,165 | 1,932 | 1,591 | 420 | 583 | 508 | 441 | 119 |
| **Flavors, perfumes, cosmetics, and toiletries** | 535 | 479 | 399 | 90 | 289 | 301 | 263 | 73 |
| **Cleaning and polishing materials** | 396 | 327 | 290 | 88 | 74 | 72 | 73 | 12 |
| **Fertilizers, manufactured** | 1,735 | 2,265 | 1,404 | 178 | 1181 | 1104 | 976 | 205 |
| **Explosives and pyrotechnics** | 90 | 87 | 62 | 22 | 61 | 59 | 58 | 25 |
| **Plastics and resins** | 3,809 | 3,884 | 3,241 | 657 | 780 | 646 | 626 | 133 |
| **Pesticides and disinfectants** | 544 | 553 | 516 | d | 283 | 263 | 190 | d |
| **Miscellaneous chemical products** | 2,187 | 2,087 | 1,649 | 574 | 534 | 496 | 379 | 95 |
| **TOTAL** | **$21,187** | **$20,740** | **$17,306** | **$3837** | **$9446** | **$8583** | **$7485** | **$1612** |

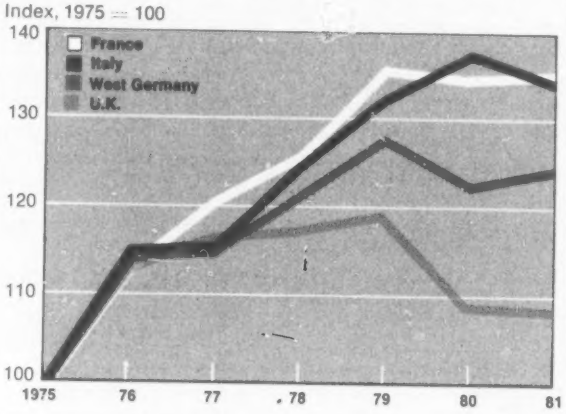
a Exports of domestic merchandise, including Department of Defense and Grant-Aid shipments; FAS (free alongside ship) value. b General imports, FAS value. c As a result of statistical reclassification, data for 1979–81 are not comparable directly to those of previous years; C&EN has rearranged earlier data to make them as comparable as possible. d Included in miscellaneous.
**Source:** Department of Commerce

The business situation was drab last year, by and large, for West European chemical producers. Output, where it had recovered at all from 1980's poor results, generally remained below the levels of 1979. And profits remained hard pressed, even though such leading companies as Akzo, BASF, DSM, and Imperial Chemical Industries showed some improvement from the previous year's depressed results.

Many of the following figures, translated into U.S. dollars, make the year appear even more glum, however, than it actually was. In 1981, all West European currencies were noticeably weaker against the U.S. dollar than in 1980. This tends to exaggerate changes in sales, profits, foreign trade, and investment when stated in dollars.

The situation in Belgium provides an example. Last year, the exchange value of the Belgian franc averaged less than 80% of what it was in 1980. Consequently, although Belgian chemical sales declined about 8% in terms of dollars, in terms of local currency they actually increased 18% to 569 billion francs.

**Chemical output weakest in U.K. in 1981**




## PRODUCTION: Volume declined for most products again last year

| Millions of lb | 1981 | 1980 | 1979 | 1978 | Change 1980–81 |
|---|---|---|---|---|---|
| **FRANCE** | | | | | |
| Sulfuric acid | 9764 | 10,894 | 10,905 | 10,096 | −10% |
| Hydrochloric acid | 1582 | 1,487 | 1,575 | 1,509 | 6 |
| Phosphoric acid | 416 | 445 | 447 | 373 | −7 |
| Chlorine | 2721 | 2,765 | 2,829 | 2,779 | −2 |
| Sodium hydroxide | 2904 | 2,946 | 3,100 | 2,948 | −1 |
| Sodium carbonate | 2867 | 3,432 | 3,410 | 2,977 | −16 |
| Ammonia | na | 4587 | 4,730 | 4,435 | — |
| Sodium sulfate | 319 | 329 | 334 | 275 | −3 |
| Sulfur | 3901 | 4,174 | 4,268 | 4,180 | −7 |
| Benzene | 1140 | 1,204 | 1,392 | 1,141 | −5 |
| Toluene | 125 | 140 | 190 | 118 | −11 |
| Xylenes | 246 | 172 | 228 | 244 | 43 |
| Ethylene | 4176 | 4,561 | 4,946 | 4,228 | −8 |
| Propylene | 2253 | 2,174 | 2,543 | 2,339 | 4 |
| Phthalic anhydride | 178 | 169 | 195 | 196 | 5 |
| Methanol | 757 | 757 | 777 | 763 | 0 |
| Formaldehyde | 231 | 254 | 309 | 277 | −9 |
| Acetone | 229 | 218 | 271 | 268 | 5 |
| Butadiene | 596 | 572 | 659 | 631 | 4 |
| Polyethylene | 1987 | 2,364 | 2,580 | 2,158 | −16 |
| Polypropylene | 578 | 464 | 444 | 319 | 46 |
| Polystyrene | 598 | 559 | 590 | 449 | 7 |
| Polyvinyl chloride | 1619 | 1,596 | 1,722 | 1,463 | 1 |
| Synthetic rubber | na | 1,124 | 1,190 | 1,080 | — |
| Phosphate fertilizers ($P_2O_5$) | 2618 | 2,989 | 2,872 | 2,660 | −12 |
| **U.K.** | | | | | |
| Sulfuric acid | 6356 | 7,537 | 7,696 | 7,599 | −16% |
| Hydrochloric acid[a] | 282 | 315 | 348 | 290 | −10 |
| Carbon black | 334 | 385 | 453 | 438 | −13 |
| Chlorine | 1905 | 2,004 | 2,262 | 2,112 | −5 |
| Benzene | 1799 | 1,753 | 2,323 | 1,947 | 3 |
| Ethylene | 2718 | 2,409 | 2,715 | 2,411 | 13 |
| Phthalic anhydride | 134 | 101 | 207 | 200 | 33 |
| Thermoplastics | 2884[b] | 2,911 | 3,659 | 3,491 | −1 |
| Polyethylene | 999 | 957 | 1,069 | 942 | 4 |
| Polypropylene | 433 | 418 | 581 | 642 | 4 |
| Polystyrene | 312 | 345 | 466 | 460 | −10 |
| Polyvinyl chloride | 693 | 770 | 957 | 902 | −10 |
| Synthetic rubber[a] | 462[b] | 473 | 509 | 645 | −2 |
| Nitrogen fertilizers (N)[a] | 1529 | 1,516 | 1,388 | 1,313 | 1 |
| Phosphate fertilizers ($P_2O_5$)[a] | 818 | 759 | 889 | 920 | 8 |
| **WEST GERMANY** | | | | | |
| Sulfuric acid | 8650 | 8,554 | 9,082 | 8,400 | 1% |
| Chlorine | 6630 | 6,591 | 7,075 | 6,624 | 1 |
| Sodium carbonate | 2616 | 3,104 | 3,080 | 2,699 | −16 |
| Ammonia | 4316 | 4,495 | 4,754 | 4,301 | −4 |
| Sodium sulfate | 226 | 416 | 458 | 464 | −46 |
| Benzene | 2028 | 2,022 | 2,213 | 1,967 | 0 |
| Toluene | 578 | 572 | 656 | 497 | 1 |
| Xylenes | 1071 | 783 | 1,085 | 913 | 37 |
| Ethylene | 6330 | 6,739 | 7,803 | 7,093 | −6 |
| Phthalic anhydride | 474 | 493 | 587 | 590 | −4 |
| Methanol | 1507 | 1,782 | 1,888 | 1,771 | −15 |
| Polyethylene | 2640 | 3,080 | 3,472 | 3,348 | −14 |
| Polyvinyl chloride | 2026 | 2,097 | 2,387 | 2,213 | −3 |
| Synthetic rubber | 914 | 900 | 981 | 926 | 2 |
| Nitrogen fertilizers (N) | 2908 | 3,252 | 2,961 | 2,781 | −11 |
| Phosphate fertilizers ($P_2O_5$) | 1399 | 1,595 | 1,547 | 1,553 | −12 |

a Manufacturers' sales. b Preliminary. **Sources:** Union des Industries Chimiques, Chemical Industries Association, Verband der Chemischen Industrie

## MAN-MADE FIBERS: Noncellulosics made some recovery last year, but cellulosics were down

| Millions of lb | 1981 | | 1980 | | 1979 | | 1978 | | 1977 | | Change, 1980–81 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Non-cellulosics[a] | Cellulosics | Non-cellulosics[a] | Cellulosics | Non-cellulosics[a] | Cellulosics | Non-cellulosics[a] | Cellulosics | Non-cellulosics[a] | Cellulosics | Non-cellulosics | Cellulosics |
| West Germany | 1736 | 321 | 1619 | 304 | 1725 | 295 | 1649 | 293 | 1568 | 290 | 7% | 6% |
| Italy | 1115[b] | 133 | 896[b] | 144 | 988 | 156 | 952 | 190 | 830 | 235 | 24 | −8 |
| U.K. | 612[c] | 298[d] | 700[c] | 364[d] | 838 | 504 | 885 | 472 | 791 | 460 | −13 | −18 |
| Spain | 518 | 111 | 452 | 116 | 466 | 128 | 416 | 133 | 351 | 128 | 14 | −4 |
| France | 444 | 118 | 423 | 146 | 493 | 169 | 542 | 163 | 532 | 179 | 5 | −19 |
| Benelux countries | 228 | 144 | 230 | 148 | 286 | 165 | 306 | 165 | 295 | 156 | −1 | −3 |
| Switzerland | 198 | 0 | 186 | 4 | 185 | 7 | 194 | 9 | 171 | 10 | 3 | — |
| Ireland | 110 | 0 | 92 | 0 | 86 | 0 | 68 | 0 | 35 | 0 | 20 | — |
| Portugal | 78 | 5 | 67 | 6 | 68 | 7 | 62 | 5 | 36 | 6 | 16 | −17 |
| Austria | 53 | 257 | 56 | 255 | 62 | 242 | 67 | 236 | 57 | 226 | −5 | 1 |

a Excludes polypropylene filament unless otherwise indicated. b Includes polypropylene filament in 1980 and 1981. c Includes cellulose acetate filament. d Excludes cellulose acetate filament.
**Source:** Comité International de la Rayonne et des Fibres Synthétiques

## CHEMICAL INDUSTRY TRENDS: Lower dollar values reflect strength of U.S. currency

| $ Billions (U.S.) | 1981 | 1980 | 1979 | 1978 | 1977 |
|---|---|---|---|---|---|
| **WEST GERMANY** | | | | | |
| Sales | $51.6 | $59.2 | $56.0 | $44.6 | $38.1 |
| Exports | 23.8 | 26.0 | 24.0 | 18.4 | 15.7 |
| Imports | 13.3 | 14.6 | 13.2 | 9.5 | 8.1 |
| Capital spending | 3.1 | 3.8 | 3.3 | 2.8 | 2.4 |
| Production index (1975 = 100) | 124.6 | 122.7 | 127.9 | 121.3 | 115.0 |
| Price index (1975 = 100) | 125.2 | 115.2 | 106.8 | 99.2 | 100.8 |
| Employees (thousands) | 548 | 550 | 547 | 548 | 553 |
| **U.K.[a]** | | | | | |
| Sales | $37.6 | $41.0 | $35.6 | $27.6 | $24.1 |
| Exports | 12.3 | 12.3 | 10.4 | 8.1 | 6.7 |
| Imports | 7.9 | 7.3 | 7.2 | 5.3 | 4.3 |
| Capital spending | 2.5 | 3.2 | 2.5 | 2.1 | 1.4 |
| Production index (1975 = 100) | 108.3 | 109.1 | 119.2 | 117.6 | 116.4 |
| Price index (1975 = 100) | 203.3 | 191.1 | 165.1 | 146.7 | 135.8 |
| Employees (thousands) | 395 | 430 | 441 | 439 | 429 |
| **FRANCE[a]** | | | | | |
| Sales | $33.4 | $37.3 | $32.9 | $24.7 | $21.6 |
| Exports | 11.9 | 13.0 | 11.5 | 8.2 | 6.6 |
| Imports | 9.2 | 10.4 | 8.9 | 6.7 | 5.4 |
| Capital spending | 1.2 | 1.6 | 1.4 | 1.1 | 0.9 |
| Production index (1975 = 100) | 135.3 | 134.4 | 135.8 | 125.8 | 120.5 |
| Price index (1975 = 100) | 182.1 | 159.6 | 134.1 | 116.2 | 111.6 |
| Employees (thousands) | 289 | 296 | 301 | 306 | 307 |
| **ITALY** | | | | | |
| Sales | $24.1 | $28.7 | $23.7 | $17.9 | $15.1 |
| Exports | 5.6 | 5.9 | 5.2 | 3.9 | 3.5 |
| Imports | 7.8 | 9.0 | 7.9 | 5.4 | 4.2 |
| Capital spending | 1.1 | 1.9 | 1.7 | 1.3 | 1.6 |
| Production index (1975 = 100) | 133.5 | 137.5 | 132.6 | 125.0 | 115.4 |
| Price index (1975 = 100) | 218.7 | 195.4 | 162.0 | 131.8 | 125.5 |
| Employees (thousands) | 271 | 289 | 291 | 292 | 293 |
| **BELGIUM** | | | | | |
| Sales | $15.3 | $16.6 | $14.4 | $10.0 | $8.5 |
| Exports | 9.2 | 10.4 | 9.3 | 7.2 | 5.7 |
| Imports | 6.4 | 7.5 | 6.6 | 5.0 | 4.4 |
| Capital spending | na | 0.5 | 0.5 | 0.5 | 0.4 |
| Production index (1975 = 100) | 129.7 | 125.4 | 133.4 | 123.4 | 119.3 |
| Price index (1975 = 100) | 134.1 | 121.1 | 107.1 | 104.2 | 104.2 |
| Employees (thousands) | 88 | 90 | 82 | 89 | 92 |

| $ Billions | 1981 | 1980 | 1979 | 1978 | 1977 |
|---|---|---|---|---|---|
| **NETHERLANDS** | | | | | |
| Sales | $13.6 | $14.3 | $13.5 | $10.0 | $8.5 |
| Exports | 11.9 | 13.0 | 11.8 | 8.6 | 7.3 |
| Imports | 7.1 | 7.9 | 7.0 | 5.1 | 4.3 |
| Capital spending | 0.6 | 0.7 | 0.6 | 0.8 | 1.0 |
| Production index (1975 = 100) | 133.0 | 130.0 | 136.0 | 124.0 | 119.3 |
| Price index (1975 = 100) | 143.0 | 125.0 | 114.0 | 103.0 | 104.9 |
| Employees (thousands) | 91 | 91 | 92 | 94 | 96 |
| **SPAIN** | | | | | |
| Sales | $15.7 | $17.3 | $15.4 | $11.1 | $9.4 |
| Exports | 2.3 | 2.5 | 2.0 | 1.2 | 1.0 |
| Imports | 3.1 | 3.5 | 3.1 | 2.1 | 1.9 |
| Capital spending | 0.4 | 0.7 | 0.6 | 0.4 | 0.4 |
| Production index (1975 = 100) | 128.5 | 132.3 | 135.0 | na | na |
| Price index (1975 = 100) | 232.5 | 202.0 | 167.0 | na | na |
| Employees (thousands) | 244 | 244 | 245 | 215 | 215 |
| **SWITZERLAND** | | | | | |
| Sales | $6.7 | $6.8 | $6.6 | $6.0 | $4.3 |
| Exports | 5.4 | 5.6 | 5.3 | 4.7 | 3.4 |
| Imports | 3.3 | 3.7 | 3.2 | 2.4 | 1.9 |
| Production index (1975 = 100) | 137.1 | 130.5 | 128.4 | 123.1 | 118.8 |
| Price index (1975 = 100) | 101.8 | 97.0 | 90.7 | 89.1 | 93.9 |
| Employees (thousands) | 63 | 62 | 62 | 62 | 61 |
| **SWEDEN** | | | | | |
| Sales | $4.1 | $4.3 | $3.9 | $3.0 | $2.8 |
| Exports | 1.6 | 1.7 | 1.5 | 1.2 | 1.0 |
| Imports | 2.5 | 2.9 | 2.7 | 2.0 | 1.8 |
| Capital spending | 0.3 | 0.4 | 0.4 | 0.3 | 0.3 |
| Production index (1975 = 100) | 108.0 | 106.3 | 111.3 | 109.2 | 102.6 |
| Price index (1975 = 100) | 167.6 | 154.0 | 134.0 | 118.0 | 108.8 |
| Employees (thousands) | 41 | 39 | 40 | 40 | 41 |
| **NORWAY** | | | | | |
| Sales | $1.9 | $2.1 | na | na | na |
| Exports | 1.5 | 1.2 | $ 0.9 | $ 0.7 | $ 0.5 |
| Imports | 1.0 | 1.1 | 1.0 | 0.8 | 0.7 |
| Capital spending | 0.1 | 0.2 | 0.1 | 0.3 | 0.4 |
| Production index (1975 = 100) | 122 | 120 | 118 | 102 | 101 |
| Price index (1975 = 100) | 141 | 131 | 116 | 103 | 100 |
| Employees | 17 | 17 | 17 | 17 | 15 |

a Excludes fibers. **na** = not available. **Sources:** National chemical federations and Conseil Européen des Fédérations de l'Industrie Chimique

## COMPANY RESULTS: Profitability remains depressed; employment generally is down

| $ Millions | Net sales | Net income | Profit margin | Capital spending | R&D spending | Employees (thousands) |
|---|---|---|---|---|---|---|
| **Hoechst (West Germany)** | | | | | | |
| 1981 | $15,236.7 | $188.5 | 1.2% | $ 870.4 | $670.4 | 185 |
| 1980 | 16,436.8 | 305.5 | 1.9 | 1053.8 | 714.8 | 187 |
| 1979 | 14,797.8 | 355.2 | 2.4 | 893.4 | 624.0 | 183 |
| 1978 | 12,156.3 | 209.5 | 1.7 | 734.2 | 539.7 | 181 |
| **Bayer (West Germany)** | | | | | | |
| 1981 | $14,930.1 | $228.8 | 1.5% | $1123.5 | $622.1 | 181 |
| 1980 | 15,837.9 | 401.1 | 2.5 | 1461.0 | 681.9 | 182 |
| 1979 | 14,208.7 | 237.7 | 1.7 | 1224.0 | 603.3 | 181 |
| 1978 | 11,475.4 | 234.7 | 2.0 | 867.8 | 513.1 | 179 |
| **BASF (West Germany)** | | | | | | |
| 1981 | $14,05[illegible].8 | $162.4 | 1.2% | $ 911.1 | $484.1 | 117 |
| 1980 | 15,236.8 | 197.3 | 1.3 | 1011.5 | 545.6 | 117 |
| 1979 | 14,150.8 | 338.3 | 2.4 | 989.6 | 487.4 | 117 |
| 1978 | 10,840.5 | 211.6 | 2.0 | 882.9 | 417.1 | 115 |
| **Imperial Chemical Industries (U.K.)** | | | | | | |
| 1981 | $13,348.9 | $389.5 | 2.9% | $ 833.7 | $464.5 | 132 |
| 1980 | 13,290.7 | 302.3[a] | 2.3 | 1683.7 | 493.0 | 143 |
| 1979 | 11,397.0 | 970.2 | 8.5 | 1613.6 | 392.8 | 148 |
| 1978 | 8,700.6 | 637.2 | 7.3 | 1345.5 | 314.8 | 151 |
| **Montedison (Italy)** | | | | | | |
| 1981 | na | na | na | na | na | na |
| 1980 | $9,090.0 | ($523.4)[b] | — | $450.9 | $205.6 | 106 |
| 1979 | 8,222.6 | 14.4 | 0.2% | 454.9 | 190.1 | 115 |
| 1978 | 6,818.2 | ($317.6)[b] | — | 631.6 | 161.7 | 127 |
| **DSM (Netherlands)** | | | | | | |
| 1981 | $7,330.4 | $40.4 | 0.6% | $196.8 | $64.0 | 30 |
| 1980 | 7,496.5 | 12.6 | 0.2 | 258.3 | 75.4 | 31 |
| 1979 | 6,343.3 | 44.3 | 0.7 | 266.7 | 67.2 | 32 |
| 1978 | 4,631.9 | 12.0 | 0.3 | 464.8 | 62.5 | 32 |
| **Ciba-Geigy (Switzerland)** | | | | | | |
| 1981 | $6,938.3 | $265.8 | 3.8% | $446.4 | $549.0 | 80 |
| 1980 | 7,134.1 | 182.6 | 2.6 | 510.8 | 561.1 | 81 |
| 1979 | 5,958.4 | 197.0 | 3.3 | 360.2 | 496.4 | 80 |
| 1978 | 4,989.9 | 201.1 | 4.0 | 309.5 | 425.7 | 75 |
| **Rhône-Poulenc (France)** | | | | | | |
| 1981 | $6,599.3 | ($44.9)[b,c] | — | $447.8 | $289.2 | 89 |
| 1980 | 7,139.2 | ($77.3)[b,d] | — | 611.6 | 354.6 | 95 |
| 1979 | 7,948.5 | 186.1 | 2.3% | 517.7 | 305.9 | 102 |
| 1978 | 5,657.3 | 52.9 | 0.9 | 3[illegible].9 | 244.2 | 107 |
| **Akzo (Netherlands)** | | | | | | |
| 1981 | $5,790.4 | $ 89.6 | 1.5% | $277.2 | $182.0 | 78 |
| 1980 | 6,257.8 | 85.4 | 1.4 | 324.1 | 258.8 | 83 |
| 1979 | 5,977.6 | 143.8 | 2.4 | 299.5 | 228.9 | 83 |
| 1978 | 4,938.0 | 22.7 | 0.5 | 200.9 | 203.7 | 83 |

| $ Millions | Net sales | Net income | Profit margin | Capital spending | R&D spending | Employees (thousands) |
|---|---|---|---|---|---|---|
| **Solvay (Belgium)** | | | | | | |
| 1981 | $4,239.7 | ($20.5)[b] | — | $247.6 | $143.4 | 48 |
| 1980 | 4,734.9 | 67.6 | 1.4% | 368.0 | 154.0 | 49 |
| 1979 | 4,126.2 | 175.2 | 4.3 | 288.7 | 98.1 | 46 |
| 1978 | 3,003.5 | 102.9 | 3.4 | 281.4 | 83.7 | 45 |
| **Hoffmann-La Roche (Switzerland)** | | | | | | |
| 1981 | $3,456.7 | $129.6 | 3.7% | $308.7 | $414.2 | 44 |
| 1980 | 3,506.5 | 138.9 | 4.0 | 309.0 | 415.0 | 44 |
| 1979 | 3,127.0 | 131.9 | 4.2 | 318.1 | 389.2 | 43 |
| 1978 | 2,706.3 | 112.2 | 4.2 | 226.3 | 355.9 | 42 |
| **BOC International (U.K.)** | | | | | | |
| 1981 | $3,088.4 | $118.8 | 3.6% | $308.9 | na | 42 |
| 1980 | 2,777.9 | 102.8 | 3.7 | 312.6 | na | 45 |
| 1979 | 2,609.3 | 94.7 | 3.6 | 280.7 | na | 49 |
| 1978 | 2,295.8 | 68.5 | 3.0 | 256.2 | na | 56 |
| **Sandoz (Switzerland)** | | | | | | |
| 1981 | $2,941.8 | $115.8 | 3.9% | $155.6 | $236.2 | 36 |
| 1980 | 2,934.1 | 121.0 | 4.1 | 153.9 | 248.5 | 36 |
| 1979 | 2,677.1 | 104.2 | 3.9 | 124.7 | 232.5 | 35 |
| 1978 | 2,400.6 | 87.2 | 3.6 | 130.2 | 211.2 | 35 |
| **CdF Chimie (France)** | | | | | | |
| 1981 | $2,169.1 | ($220.6)[b] | — | $ 49.6 | $32.2 | 12 |
| 1980 | 2,576.8 | (130.0)[b] | — | 87.5 | 43.7 | 13 |
| 1979 | 2,346.4 | 13 | 0.1% | 110.6 | 23.5 | 16 |
| 1978 | 1,501.3 | (58.2)[b] | — | 200.0 | 20.4 | 13 |
| **Albright & Wilson (U.K.)** | | | | | | |
| 1981 | $1,020.3 | $17.0 | 1.7% | $51.7 | na | 9 |
| 1980 | 986.0 | (4.0)[b] | — | 70.5 | na | 9 |
| 1979 | 838.4 | 36.1 | 4.3 | 69.2 | na | 10 |
| 1978 | 656.6 | 44.3 | 6.7 | 83.3 | na | 10 |
| **Fisons (U.K.)** | | | | | | |
| 1981 | $1,002.8 | $ 7.8 | 0.8% | $17.0 | na | 10 |
| 1980 | 1,055.1 | (3.3)[b] | — | 28.1 | $32.6 | 11 |
| 1979 | 919.3 | 28.1 | 3.1 | 36.3 | 30.6 | 13 |
| 1978 | 668.5 | 36.0 | 5.4 | 38.4 | 25.0 | 13 |
| **UCB (Belgium)** | | | | | | |
| 1981 | $686.0 | $ 6.9 | 1.0% | $31.0 | $18.7 | 8 |
| 1980 | 786.4 | 7.5 | 1.0 | 38.2 | 21.9 | 8 |
| 1979 | 695.4 | 11.3 | 1.6 | 21.0 | 19.6 | 8 |
| 1978 | 559.9 | 1.7 | 0.3 | 23.5 | 18.3 | 9 |
| **Laporte Industries (U.K.)** | | | | | | |
| 1981 | $435.5 | $12.8 | 2.9% | $20.3 | na | 4 |
| 1980 | 457.0 | 7.4 | 1.6 | 37.2 | na | 5 |
| 1979 | 403.6 | 17.4 | 4.3 | 34.0 | na | 5 |
| 1978 | 320.7 | 10.2 | 3.2 | 23.0 | na | 5 |

a Excludes extraordinary write-off for company restructuring of $348.8 million. b Deficit. c Excludes extraordinary write-off for company restructuring of $16.7 million. d Excludes extraordinary write-off for company restructuring of $383 million. na = not available.

## NOTE ON CURRENCY CONVERSION

For monetary statistics in this section, European currencies were converted to U.S. dollars by the following conversion rates:

| | $1.00 (U.S.) is equivalent to: | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Belgium | France | Italy | Netherlands | Norway | Spain | Sweden | Switzerland | U.K. | West Germany |
| 1981 | 37.13 francs | 5.44 francs | 1137 lire | 2.50 guilders | 5.74 crowns | 92.31 pesetas | 5.06 crowns | 1.96 francs | 0.492 pound | 2.26 marks |
| 1980 | 29.24 francs | 4.23 francs | 856 lire | 1.99 guilders | 4.94 crowns | 71.71 pesetas | 4.23 crowns | 1.67 francs | 0.430 pound | 1.82 marks |
| 1979 | 29.32 francs | 4.25 francs | 831 lire | 2.01 guilders | 5.06 crowns | 67.12 pesetas | 4.29 crowns | 1.66 francs | 0.471 pound | 1.83 marks |
| 1978 | 31.67 francs | 4.50 francs | 847 lire | 2.16 guilders | 5.22 crowns | 76.00 pesetas | 4.52 crowns | 1.79 francs | 0.521 pound | 1.99 marks |
| 1977 | 35.84 francs | 4.91 francs | 882 lire | 2.45 guilders | 5.33 crowns | 76.00 pesetas | 4.45 crowns | 2.40 francs | 0.573 pound | 2.26 marks |

# 6 Foreign Chemical Industries Japan

Japanese chemical companies, especially those that rely heavily on basic petrochemicals, are between a rock and a hard place. Japan's economy has been struggling. Recovery has been delayed. As a result, domestic demand is down and chemical production reflects this.

Meanwhile, chemical imports have been pouring into Japan but chemical exports aren't increasing as they have in the past. Japan's chemical trade surplus, which exceeded $900 million in 1979, was down to only $354 million last year, according to official government statistics. Industry figures indicate, however, that the chemical trade balance turned into a deficit last year.

The industry needs new investment to replace old and inefficient plants. But chemical companies are hurting on the bottom line, and their fiscal 1982 direct investment is estimated to drop 16%. The industry's basic problem is high-priced naphtha. The government is taking steps to improve the naphtha situation. This should help, but won't cure all of the industry's ills.

## WORLD TRADE: Chemical trade surplus lower

| $ Millions | 1981 | 1980 | 1979 | 1978 |
|---|---|---|---|---|
| **Total exports** | $152,030 | $129,807 | $103,032 | $97,543 |
| **Total imports** | 143,290 | 140,528 | 110,672 | 79,343 |
| **Chemical exports** | 6,841 | 6,767 | 6,100 | 5,102 |
| **Chemical imports** | 6,487 | 6,202 | 5,178 | 3,763 |

**Source:** Ministry of International Trade & Industry

## INDUSTRY TRENDS: Chemical output slips

| Index, 1975 = 100 | 1981 | 1980 | 1979 | Change 1980–81 |
|---|---|---|---|---|
| **All chemicals** | | | | |
| Production | 144.9 | 144.7 | 143.1 | 0% |
| Shipments | 137.7 | 139.9 | 143.6 | −2 |
| Inventories | 112.7 | 113.5 | 101.1 | −1 |
| **Petrochemicals** | | | | |
| Production | 126.4 | 133.6 | 147.4 | −5 |
| Shipments | 126.3 | 132.1 | 147.1 | −4 |
| Inventories | 124.5 | 132.6 | 112.5 | −6 |
| **Plastics** | | | | |
| Production | 142.4 | 149.3 | 160.4 | −5 |
| Shipments | 142.6 | 149.1 | 161.4 | −4 |
| Inventories | 111.2 | 116.2 | 99.7 | −4 |
| **Synthetic fibers** | | | | |
| Production | 126.0 | 128.7 | 129.7 | −2 |
| Shipments | 131.7 | 131.7 | 136.2 | 0 |
| Inventories | 81.3 | 77.1 | 80.4 | 5 |
| **Synthetic rubber** | | | | |
| Production | 128.1 | 138.7 | 140.4 | −8 |
| Shipments | 120.7 | 129.7 | 131.0 | −7 |
| Inventories | 118.5 | 125.1 | 102.0 | −5 |
| **Fertilizer** | | | | |
| Production | 72.6 | 85.5 | 90.2 | −15 |
| Shipments | 79.1 | 93.6 | 99.7 | −15 |
| Inventories | 75.0 | 72.0 | 72.1 | 4 |
| **All manufacturing** | | | | |
| Production | 147.2 | 142.8 | 133.3 | 3 |
| Shipments | 139.9 | 137.1 | 130.7 | 2 |
| Inventories | 114.4 | 110.4 | 102.6 | 4 |

**Source:** Ministry of International Trade & Industry

## PRODUCTION: 1981 is another down year

| Thousands of metric tons unless otherwise indicated | 1981 | 1980 | 1979 | 1978 | Change 1980–81 |
|---|---|---|---|---|---|
| **ORGANIC CHEMICALS** | | | | | |
| **Acetaldehyde** | 324 | 432 | 583 | 587 | −25% |
| **Acetic acid** | 365 | 418 | 502 | 518 | −13 |
| **Acetone** | 225 | 235 | 254 | 261 | −4 |
| **Acrylonitrile** | 477 | 469 | 579 | 609 | 2 |
| **Benzene** | 1899 | 2060 | 2178 | 2015 | −8 |
| **Butadiene** | 518 | 574 | 670 | 658 | −10 |
| **Butyl alcohol** | 237 | 222 | 252 | 222 | 7 |
| **Caprolactam** | 427 | 443 | 437 | 427 | −4 |
| **Cyclohexane** | 475 | 500 | 509 | 477 | −5 |
| **Dioctylphthalate** | 223 | 241 | 259 | 265 | −7 |
| **Ethylene** | 3644 | 4176 | 4781 | 4387 | −13 |
| **Ethylene dichloride** | 1650 | 2060 | 2110 | 1837 | −20 |
| **Ethylene glycol** | 411 | 492 | 572 | 630 | −16 |
| **Ethylene oxide** | 478 | 529 | 593 | 631 | −10 |
| **Methanol,** refined | 734 | 836 | 940 | 907 | −12 |
| **Octyl alcohol,** synthetic | 239 | 241 | 264 | 254 | −1 |
| **Phenol,** synthetic | 214 | 215 | 244 | 249 | 0 |
| **Phthalic anhydride** | 254 | 235 | 284 | 288 | 8 |
| **Propylene** | 2538 | 2636 | 3096 | 2963 | −4 |
| **Propylene glycol** | 171 | 163 | 168 | 163 | 5 |
| **Styrene** | 1095 | 1114 | 1238 | 1122 | −2 |
| **Terephthalic acid** | 635 | 601 | 613 | 590 | 6 |
| **Toluene** | 821 | 889 | 938 | 861 | −7 |
| **Toluene diisocyanate** | 64 | 67 | 66 | 61 | −4 |
| **Xylene** | 1202 | 1195 | 1317 | 1248 | 1 |
| **INORGANIC CHEMICALS** | | | | | |
| **Ammonium chloride** | 584 | 683 | 753 | 718 | −14 |
| **Ammonium sulfate** | 1815 | 1879 | 1883 | 1929 | −3 |
| **Calcium carbide** | 495 | 550 | 570 | 555 | −10 |
| **Calcium superphosphate** | 483 | 591 | 568 | 551 | −18 |
| **Carbon black** | 557 | 575 | 538 | 489 | −3 |
| **Chlorine,** liquid | 764 | 763 | 729 | 651 | 0 |
| **Hydrochloric acid** | 565 | 570 | 528 | 540 | −1 |
| **Nitrogen,** millions of cu m | 5147 | 4586 | 4150 | 3717 | 12 |
| **Oxygen,** millions of cu m | 6603 | 6854 | 7070 | 6327 | −4 |
| **Sodium carbonate** | 1175 | 1357 | 1355 | 1162 | −13 |
| **Sodium hydroxide** | 2871 | 3159 | 3021 | 2777 | −9 |
| **Sodium silicate** | 692 | 712 | 714 | 654 | −3 |
| **Sulfuric acid** | 6572 | 6777 | 6581 | 6437 | −3 |
| **Titanium dioxide** | 176 | 173 | 185 | 171 | 2 |
| **PLASTICS** | | | | | |
| **Phenolic resins** | 294 | 304 | 300 | 268 | −3 |
| **Polyethylene** | 1671 | 1860 | 2165 | 1767 | −10 |
| **Polypropylene** | 959 | 927 | 1023 | 745 | 3 |
| **Polystyrene** | 1183 | 1129 | 1227 | 1032 | 5 |
| **Polyvinyl chloride** | 1129 | 1429 | 1592 | 1204 | −21 |
| **DYES,** synthetic | 50 | 51 | 60 | 54 | −2 |
| **RUBBER CHEMICALS,** organic | 43 | 46 | 45 | 41 | −7 |
| **RUBBER,** synthetic | 1010 | 1094 | 1107 | 1029 | −8 |

**Source:** Ministry of International Trade & Industry

## COMPANY RESULTS: Profits still hard to come by for Japanese chemical companies

| $ Millions | Sales | Net income | Profit margin | Total assets | Employees (thousands) |
|---|---|---|---|---|---|
| **Mitsubishi Chemical Industries[a]** | | | | | |
| 1981 | $3375 | $22.5 | 0.7% | $3374 | 8.3 |
| 1980 | 3730 | 39.8 | 1.1 | 3739 | 8.0 |
| 1979 | 2742 | 25.5 | 0.9 | 2996 | 8.2 |
| 1978 | 2458 | 11.0 | 0.5 | 3535 | 8.7 |
| **Sumitomo Chemical[b]** | | | | | |
| 1981 | $2880 | $22.5 | 0.8% | $2699 | 9.6 |
| 1980 | 3167 | 45.0 | 1.4 | 2856 | 9.7 |
| 1979 | 2202 | 45.0 | 2.0 | 2017 | 9.9 |
| 1978 | 2078 | 18.6 | 0.9 | 2532 | 10.8 |
| **Asahi Chemical Industry** | | | | | |
| 1981 | $2723 | $45.0 | 1.7% | $2895 | 13.6 |
| 1980 | 2800 | 64.4 | 2.3 | 2825 | 13.6 |
| 1979 | 2168 | 47.2 | 2.2 | 2266 | 13.8 |
| 1978 | 2029 | 33.9 | 1.6 | 2476 | 14.3 |
| **Toray Industries** | | | | | |
| 1981 | $2475 | $51.8 | 2.1% | $2446 | 13.9 |
| 1980 | 2494 | 57.9 | 2.3 | 2408 | 13.8 |
| 1979 | 1924 | 55.7 | 2.9 | 2010 | 13.9 |
| 1978 | 1929 | 40.3 | 2.1 | 2271 | 14.7 |
| **Teijin** | | | | | |
| 1981 | $2160 | $24.8 | 1.1% | $2090 | 7.2 |
| 1980 | 2111 | 28.3 | 1.3 | 2093 | 7.3 |
| 1979 | 1613 | 28.8 | 1.8 | 1815 | 7.2 |
| 1978 | 1611 | 10.7 | 0.7 | 2016 | 7.7 |
| **Mitsui Toatsu Chemicals** | | | | | |
| 1981 | $1935 | ($22.5)[c] | — | $1858 | 7.4 |
| 1980 | 1965 | (32.8)[c] | — | 1941 | 7.7 |
| 1979 | 1624 | 36.3 | 2.2% | 1613 | 7.8 |
| 1978 | 1455 | 5.4 | 0.4 | 1773 | 8.3 |
| **Showa Denko[b]** | | | | | |
| 1981 | $1710 | $ 4.5 | 0.3% | $2102 | 5.4 |
| 1980 | 2083 | 35.7 | 1.7 | 2276 | 5.5 |
| 1979 | 1496 | 27.3 | 1.8 | 1475 | 4.3 |
| 1978 | 1339 | 17.6 | 1.3 | 1850 | 5.2 |
| **Dainippon Ink & Chemicals** | | | | | |
| 1981 | $1688 | $19.1 | 1.1% | $1511 | 5.9 |
| 1980 | 1654 | 22.1 | 1.3 | 1448 | 5.8 |
| 1979 | 1301 | 18.4 | 1.4 | 1124 | 5.5 |
| 1978 | 1248 | 19.4 | 1.6 | 1084 | 5.5 |
| **Mitsubishi Petrochemical[b]** | | | | | |
| 1981 | $1665 | $ 0.0 | 0.0% | $1802 | 3.9 |
| 1980 | 1900 | 16.2 | 0.9 | 1908 | 3.8 |
| 1979 | 1366 | 16.5 | 1.2 | 1384 | 3.9 |
| 1978 | 1213 | 8.8 | 0.7 | 1607 | 4.3 |
| **Sekisui Chemical** | | | | | |
| 1981 | $1350 | $15.8 | 1.2% | $1322 | 6.1 |
| 1980 | 1420 | 17.0 | 1.2 | 1359 | 6.1 |
| 1979 | 1195 | 17.3 | 1.5 | 1107 | 6.0 |
| 1978 | 1128 | 7.4 | 0.7 | 1025 | 5.9 |
| **Mitsui Petrochemical Industries** | | | | | |
| 1981 | $1296 | $ 3.6 | 0.3% | $1455 | 4.6 |
| 1980 | 1339 | 10.8 | 0.8 | 1474 | 4.6 |
| 1979 | 1167 | 23.2 | 2.0 | 1127 | 4.8 |
| 1978 | 914 | 11.0 | 1.2 | 1221 | 4.8 |
| **Unitika** | | | | | |
| 1981 | $ 986 | $ 0.0 | 0.0% | $1135 | 6.2 |
| 1980 | 1011 | 4.1 | 0.4 | 1229 | 6.3 |
| 1979 | 785 | 2.3 | 0.3 | 1024 | 6.5 |
| 1978 | 865 | 12.0 | 1.4 | 1246 | 6.8 |

| $ Millions | Sales | Net income | Profit margin | Total assets | Employees (thousands) |
|---|---|---|---|---|---|
| **Toyo Soda Mfg.** | | | | | |
| 1981 | $968 | ($4.5)[c] | — | $1209 | 4.9 |
| 1980 | 942 | 5.2 | 0.6% | 1251 | 5.0 |
| 1979 | 809 | 14.5 | 1.8 | 977 | 4.9 |
| 1978 | 721 | 10.5 | 1.5 | 1075 | 5.0 |
| **Kyowa Hakko Kogyo[b]** | | | | | |
| 1981 | $923 | $18.5 | 2.0% | $782 | 4.9 |
| 1980 | 945 | 14.9 | 1.6 | 749 | 5.0 |
| 1979 | 694 | 12.1 | 1.7 | 585 | 4.8 |
| 1978 | 692 | 13.1 | 1.9 | 659 | 4.8 |
| **Mitsubishi Gas Chemical** | | | | | |
| 1981 | $900 | $21.2 | 2.4% | $938 | 3.8 |
| 1980 | 898 | 30.7 | 3.4 | 948 | 3.8 |
| 1979 | 714 | 19.7 | 2.8 | 740 | 3.8 |
| 1978 | 604 | 10.9 | 1.8 | 824 | 3.8 |
| **Denki Kagaku Kogyo** | | | | | |
| 1981 | $891 | $ 9.5 | 1.1% | $1092 | 4.0 |
| 1980 | 893 | 10.8 | 1.2 | 1078 | 4.0 |
| 1979 | 761 | 17.1 | 2.3 | 881 | 4.0 |
| 1978 | 691 | 9.6 | 1.4 | 942 | 4.1 |
| **Mitsubishi Rayon** | | | | | |
| 1981 | $891 | $ 9.9 | 1.1% | $803 | 3.5 |
| 1980 | 882 | 11.1 | 1.3 | 814 | 3.5 |
| 1979 | 676 | 23.6 | 3.5 | 703 | 3.4 |
| 1978 | 701 | (5.1)[c] | — | 808 | 3.7 |
| **Kuraray** | | | | | |
| 1981 | $887 | $6.8 | 0.8% | $928 | 5.3 |
| 1980 | 956 | 7.5 | 0.8 | 984 | 5.7 |
| 1979 | 762 | 2.7 | 0.4 | 824 | 5.2 |
| 1978 | 790 | 1.0 | 0.1 | 920 | 5.4 |
| **Tokuyama Soda** | | | | | |
| 1981 | $779 | $6.3 | 0.8% | $691 | 2.5 |
| 1980 | 767 | 5.2 | 0.7 | 682 | 2.4 |
| 1979 | 616 | 5.8 | 0.9 | 546 | 2.4 |
| 1978 | 568 | 6.5 | 1.1 | 606 | 2.4 |
| **Japan Synthetic Rubber** | | | | | |
| 1981 | $765 | $ 3.2 | 0.4% | $720 | 2.7 |
| 1980 | 779 | 8.2 | 1.1 | 761 | 2.6 |
| 1979 | 542 | 12.6 | 2.3 | 579 | 2.6 |
| 1978 | 514 | 6.6 | 1.3 | 595 | 2.7 |
| **Hitachi Chemical** | | | | | |
| 1981 | $747 | $9.9 | 1.3% | $451 | 4.3 |
| 1980 | 746 | 8.2 | 1.1 | 440 | 4.3 |
| 1979 | 596 | 8.6 | 1.4 | 336 | 4.1 |
| 1978 | 602 | 6.6 | 1.1 | 365 | 4.0 |
| **Kanegafuchi Chemical Industry** | | | | | |
| 1981 | $743 | $ 8.1 | 1.1% | $583 | 3.2 |
| 1980 | 776 | 13.3 | 1.7 | 612 | 3.1 |
| 1979 | 661 | 16.0 | 2.4 | 466 | 3.0 |
| 1978 | 616 | 7.9 | 1.3 | 534 | 3.0 |
| **Daicel Chemical** | | | | | |
| 1981 | $707 | $12.2 | 1.7% | $656 | 3.1 |
| 1980 | 677 | 12.6 | 1.9 | 659 | 3.1 |
| 1979 | 501 | 15.7 | 3.1 | 467 | 3.1 |
| 1978 | 467 | 8.6 | 1.8 | 461 | 3.4 |
| **Shin Etsu Chemical[d]** | | | | | |
| 1981 | $666 | $ 8.1 | 1.2% | $629 | 2.4 |
| 1980 | 653 | 11.5 | 1.8 | 600 | 2.3 |
| 1979 | 551 | 14.3 | 2.6 | 418 | 2.2 |
| 1978 | 485 | 7.9 | 1.6 | 478 | 2.3 |

a Fiscal year starts Jan. 31. b Fiscal year starts Dec. 31. c Deficit. d Fiscal year starts May 31. **Note:** Fiscal years starting March 31 of each year unless otherwise specified. Fiscal year 1981 data are estimates. Results were converted from yen to U.S. dollars on the following basis: fiscal year 1981: $1.00 = 222.4 Y; fiscal year 1980: $1.00 = 212.9 Y; fiscal year 1979: $1.00 = 249.4 Y; fiscal year 1978: $1.00 = 209.3 Y. Year-to-year changes in sales, net income, and assets are affected by fluctuations in the currency exchange rate. **Source:** Toyo Keizai Shinposha

# 6 Foreign Chemical Industries Canada

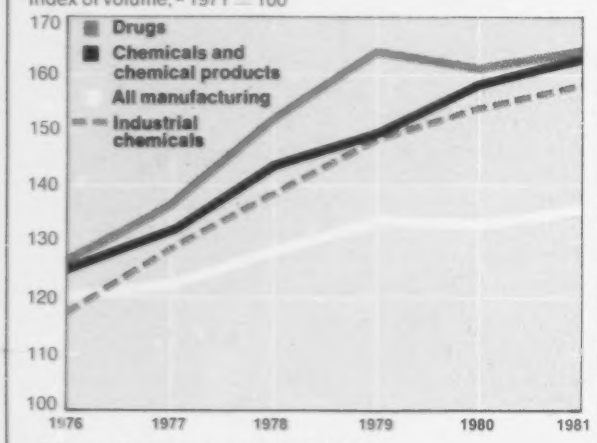
The Canadian chemical industry would rather forget last year and concentrate on the future. The industry enjoys an ample supply of potentially inexpensive hydrocarbons that is the envy of industries in other countries. But Canadian chemical companies learned the hard way last year that feedstock supply alone doesn't guarantee big profits.

Three ingredients were missing. One was feedstock that was as inexpensive as chemical companies had expected. Government energy policies pushed feedstock costs unexpectedly high.

Meanwhile, the Canadian economy turned sour in the second half of the year. Demand dropped and producers weren't able to pass through raw material price increases to their customers.

And although chemical exports, which have become an important element in Canadian chemical marketing, increased, generally poor international markets kept prices—and margins—low. As a result, profits of many Canadian chemical companies dropped substantially.

## Chemical output rises, but pace slows




a Gross domestic product. **Source:** Statistics Canada

## TRADE BALANCE: Total surplus narrows . . .

| $ Millions (Canadian) | 1981 | 1980 | 1979 | 1978 |
|---|---|---|---|---|
| Exports[a,b] | $80,895 | $74,259 | $64,317 | $50,102 |
| Imports[c] | 78,665 | 69,128 | 62,871 | 52,259 |
| Trade balance | 2,230 | 5,131 | 1,446 | −2,157 |

## . . . but chemical surplus continues to expand

| $ Millions (Canadian) | 1981 | 1980 | 1979 | 1978 |
|---|---|---|---|---|
| Chemical exports[b,d] | $4634 | $4055 | $3322 | $2351 |
| Chemical imports | 3811 | 3354 | 3240 | 2618 |
| Chemical trade balance | 823 | 701 | 82 | −267 |

a Includes re-exports. b Values as declared on export documents; may include shipping costs. c Values as established for duty purposes. d Domestic exports only. **Source:** Statistics Canada

## PRODUCTION: Plastics chalk up best gains

| Thousands of metric tons | 1981 | 1980 | 1979 | 1978 | Change 1980–81 |
|---|---|---|---|---|---|
| Ammonia, anhydrous | 2654.0 | 2555.6 | 2105.3 | 2642.9 | 4% |
| Ammonium nitrate | 911.0 | 873.5 | 914.5 | 959.9 | 4 |
| Ammonium phosphate | 1355.0 | 1466.2 | 1335.7 | 1299.5 | −8 |
| Benzene | 566.5 | 560.0 | 492.9 | na | 1 |
| Chlorine | 1292.0 | 1301.8 | 1031.4 | 1037.0 | −1 |
| Ethylene | 1330.2 | 1196.7 | 1013.8 | 910.2 | 11 |
| Hydrochloric acid | 185.7 | 176.8 | 154.4 | 170.4 | 5 |
| Phosphoric acid, 100% $P_2O_5$ | 743.8 | 807.9 | 747.7 | 610.5 | −8 |
| Polyesters, unsaturated | 26.4 | 27.4 | 32.0 | 20.3 | −4 |
| Polyethylene | 673.3 | 641.7 | 628.2 | 477.5 | 5 |
| Polystyrene | 122.6 | 109.8 | 123.8 | 98.8 | 12 |
| Polyvinyl chloride | 222.1 | 190.4 | 149.4 | 124.7 | 17 |
| Sodium chlorate | 254.8 | 244.6 | 223.8 | 219.5 | 4 |
| Sodium hydroxide | 1457.8 | 1495.2 | 1138.3 | 1142.2 | 0 |
| Sulfuric acid, 100% | 4116.9 | 4295.4 | 3666.1 | 3594.5 | −4 |
| Urea | 1303.5 | 1274.3 | 1211.7 | 1341.7 | 2 |

na = not available. **Source:** Statistics Canada

## COMPANY RESULTS: Profit margins shrink

| $ Millions (Canadian)[a] | Sales | Net income[b] | Profit margin | Capital expenditures | Employees (thousands) |
|---|---|---|---|---|---|
| **C-I-L INC.[c]** | | | | | |
| 1981 | $1149.9 | $54.3 | 4.7% | $94.1 | 7.8 |
| 1980 | 1004.2 | 51.5 | 5.1 | 70.2 | 8.3 |
| 1979 | 880.0 | 36.3 | 4.1 | 84.4 | 8.0 |
| 1978 | 746.9 | 26.4 | 3.5 | 97.5 | 8.0 |
| **CELANESE CANADA** | | | | | |
| 1981 | $373.0 | $20.4 | 5.4% | $87.7 | 3.5 |
| 1980 | 336.2 | 24.2 | 7.2 | 55.1 | 4.2 |
| 1979 | 353.6 | 21.2 | 6.0 | 24.4 | 4.4 |
| 1978 | 290.7 | 7.4 | 2.4 | 18.2 | 4.6 |
| **DOW CHEMICAL CANADA[d]** | | | | | |
| 1981 | $837.0 | $67[e] | 8.0%[e] | $149 | 4.0 |
| 1980 | 751.0 | 59[e] | 8.1[e] | 113 | 4.0 |
| 1979 | 629.7 | 50[e] | 7.9[e] | 292 | 3.8 |
| 1978 | 438.5 | 27.6[e] | 6.3[e] | 250.4 | 3.3 |
| **DU PONT CANADA** | | | | | |
| 1981 | $1139.1 | $33.5 | 2.9% | $47.0 | 6.1 |
| 1980 | 995.3 | 42.6 | 4.3 | 53.2 | 5.9 |
| 1979 | 879.6 | 58.9 | 6.7 | 23.3 | 5.6 |
| 1978 | 661.9 | 10.2 | 1.5 | 10.7 | 5.4 |
| **UNION CARBIDE CANADA** | | | | | |
| 1981 | $827.3 | $36.1 | 4.4% | $100.0 | 5.0 |
| 1980 | 794.8 | 79.6 | 10.0 | 58.9 | 5.0 |
| 1979 | 685.9 | 57.8 | 8.4 | 30.1 | 4.8 |
| 1978 | 528.2 | 20.1 | 3.8 | 46.3 | 4.7 |

a Unless otherwise indicated. b Excluding extraordinary gains and losses. c Name changed from Canadian Industries Ltd. on Jan. 1, 1980. d Amounts in U.S. dollars. e Before taxes.

## SHIPMENTS: Petroleum sets the pace but growth in chemicals is a bit above average

| $ Millions (Canadian) | Shipments, monthly average | | | | | | | | | | | Average annual change | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1981 | 1980 | 1979 | 1978 | 1977 | 1976 | 1975 | 1974 | 1973 | 1972 | 1971 | 1980–81 | 1971–81 |
| **All manufacturing** | $15,691.3 | $13,913.2 | $12,520.7 | $10,743.7 | $9070.6 | $8190.4 | $7371.6 | $6871.2 | $5563.1 | $4687.2 | $4189.5 | 12.7% | 14.1% |
| **Chemicals and chemical products** | 1,056.7 | 929.7 | 791.9 | 663.3 | 535.6 | 475.3 | 425.6 | 383.9 | 291.9 | 246.2 | 231.8 | 13.7 | 16.4 |
| **Petroleum and coal products** | 1,597.7 | 1,206.7 | 1,003.0 | 837.9 | 711.0 | 576.8 | 496.1 | 432.1 | 256.1 | 203.4 | 176.2 | 32.4 | 24.5 |
| **Rubber and plastics products** | 370.7 | 334.7 | 300.3 | 250.1 | 211.0 | 192.7 | 162.9 | 152.8 | 131.4 | 109.7 | 97.0 | 10.8 | 14.2 |
| **Paper and allied products** | 1,265.4 | 1,185.5 | 1,032.0 | 839.5 | 744.8 | 685.7 | 594.2 | 639.7 | 439.2 | 367.8 | 333.4 | 6.7 | 14.2 |

**Source:** Statistics Canada

## PRICES: Increases for industrial chemicals are greater than for industrial products as a whole

| Industry selling price indexes, 1971 = 100 | Annual average | | | | | | | | | Annual change | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1981 | 1980 | 1979 | 1978 | 1977 | 1976 | 1975 | 1974 | 1973 | 1980–81 | 1971–81 |
| **All manufacturing industries** | 272.2 | 247.2 | 217.8 | 190.4 | 174.3 | 161.6 | 153.7 | 138.1 | 116.1 | 10.1% | 11.0% |
| **Chemicals and chemical products** | 286.2 | 251.6 | 214.8 | 189.3 | 175.9 | 167.2 | 160.3 | 137.1 | 106.5 | 13.8 | 11.4 |
| **Industrial chemicals—inorganic** | 313.9 | 275.3 | 234.1 | 204.1 | 188.4 | 179.7 | 169.5 | 133.5 | 107.7 | 14.0 | 11.8 |
| Acetylene, compressed | 266.3 | 232.9 | 213.2 | 191.2 | 170.7 | 163.7 | 150.6 | 116.2 | 102.9 | 14.3 | 9.9 |
| Caustic soda | 383.8 | 281.0 | 240.1 | 221.4 | 210.7 | 195.7 | 169.5 | 120.2 | 107.0 | 36.6 | 14.4 |
| Chlorine | 274.8 | 248.4 | 207.9 | 189.2 | 180.5 | 163.3 | 144.4 | 114.1 | 104.3 | 10.6 | 10.9 |
| Oxygen, gas and liquid | 215.6 | 202.4 | 191.8 | 174.6 | 156.8 | 152.1 | 136.0 | 121.2 | 108.3 | 6.5 | 7.2 |
| **Industrial chemicals—organic** | 410.2 | 354.7 | 289.0 | 249.8 | 228.1 | 214.2 | 201.2 | 170.0 | 107.8 | 15.6 | 13.9 |
| **Plastics and synthetic resins** | 294.7 | 274.4 | 239.7 | 206.4 | 193.3 | 187.4 | 181.6 | 156.0 | 104.2 | 7.4 | 9.4 |
| Alkyd | 196.5 | 176.9 | 158.4 | 137.5 | 129.4 | 131.4 | 135.1 | 134.8 | 109.4 | 11.1 | 8.4 |
| Phenol formaldehyde | 337.6 | 332.8 | 300.9 | 233.6 | 232.1 | 235 6 | 240.9 | 214.1 | 111.4 | 1.4 | 7.5 |
| Polyethylene | 326.9 | 315.3 | 268.9 | 223.2 | 220.3 | 221.6 | 213.2 | 166.3 | 103.2 | 3.7 | 8.1 |
| **Fertilizers, mixed** | 290.5 | 280.3 | 229.1 | 191.0 | 180.2 | 176.9 | 204.0 | 167.5 | 117.2 | 3.6 | 10.4 |
| **Drugs** | 189.7 | 169.5 | 153.1 | 140.4 | 131.4 | 127.0 | 121.1 | 109.9 | 103.5 | 11.9 | 8.3 |
| **Paint and varnish** | 280.3 | 239.8 | 202.3 | 183.0 | 172.8 | 161.9 | 153.9 | 131.9 | 108.2 | 16.9 | 11.6 |
| **Pigments and dry colors** | 304.4 | 260.0 | 219.6 | 189.7 | 175.3 | 164.9 | 153.4 | 136.0 | 103.7 | 17.1 | 13.1 |
| **Soaps and cleansing compounds** | 209.7 | 189.1 | 169.5 | 151.2 | 141.1 | 134.5 | 132.1 | 118.0 | 105.3 | 10.9 | 9.2 |

**Source:** Statistics Canada

## CHEMICAL IMPORTS: Big gains for most

| $ Millions (Canadian)[a] | 1981 | 1980 | 1979 | Change 1980–81 |
|---|---|---|---|---|
| **Inorganic chemicals** | $ 401.1 | $ 344.1 | $ 353.2 | 17% |
| **Organic chemicals** | 1087.3 | 930.1 | 895.3 | 17 |
| **Fertilizers and fertilizer materials** | 158.9 | 134.9 | 135.1 | 18 |
| **Synthetic and reclaimed rubber** | 159.8 | 126.3 | 118.9 | 27 |
| **Plastics materials** | 605.1 | 537.2 | 564.4 | 13 |
| **Plastic film and sheet** | 242.1 | 192.2 | 181.7 | 26 |
| **Other plastics basic shapes and forms** | 154.2 | 128.5 | 135.5 | 20 |
| **Dyes, except dyeing intermediates** | 76.0 | 79.8 | 81.7 | −5 |
| **Pigments, lakes, and toners** | 64.4 | 53.5 | 62.1 | 20 |
| **Paints and related products** | 98.4 | 86.2 | 94.9 | 14 |
| **Other chemical products** | 763.3 | 741.4 | 617.5 | 3 |
| **TOTAL** | **$3810.7** | **$3354.2** | **$3240.3** | **14%** |

a Values as established for duty purposes. **Source:** Statistics Canada

## CHEMICAL EXPORTS: Organics up sharply

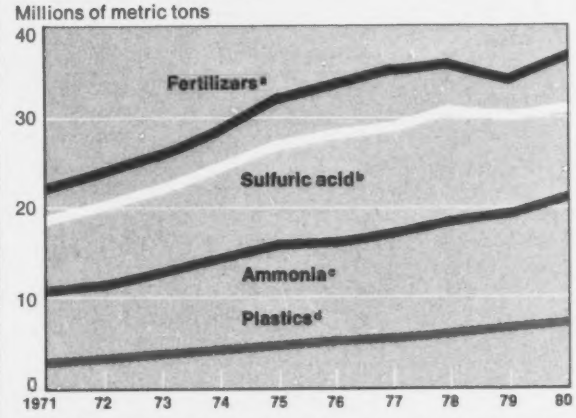
| $ Millions (Canadian)[a] | 1981 | 1980 | 1979 | Change 1980–81 |
|---|---|---|---|---|
| **Chemical elements** | $ 181.0 | $ 160.4 | $ 146.0 | 13% |
| **Other inorganic chemicals** | 1052.4 | 947.3 | 839.7 | 11 |
| **Organic chemicals** | 1185.9 | 923.9 | 704.8 | 28 |
| **Fertilizers and fertilizer materials** | 1345.6 | 1253.8 | 987.3 | 7 |
| **Synthetic rubber and plastic materials** | 514.6 | 467.0 | 367.3 | 10 |
| **Plastics basic shapes and forms** | 149.0 | 123.5 | 119.3 | 21 |
| **Other chemical products** | 205.6 | 178.9 | 157.6 | 15 |
| **TOTAL** | **$4634.0** | **$4054.7** | **$3321.8** | **14%** |

a Domestic exports only. Values as declared on export documents; may include shipping costs.
**Source:** Statistics Canada

# 6 Foreign Chemical Industries Eastern Europe

In 1981, economic growth continued to decelerate in Eastern Europe as a whole, as it has since 1977, generally falling short even of the lower targets set under current five-year plans. Industrial output for the U.S.S.R. and its six East European allies was up just 2% (the target was 4%). Bulgaria, East Germany, and Hungary increased production more than in 1980, but the area's average was lowered especially by Poland's chaotic economy, where production was down 13%. Excluding Poland, area production was up 3%. The chemical and rubber industries performed strongest in Bulgaria (up 11%) and the Soviet Union (up 5%), where both were exactly on target.

## Chemical production in Eastern Europe speeded up in 1980




a As N, $P_2O_5$, and $K_2O$. b 100% $H_2SO_4$. c Nitrogen content. d Including resins for man-made fibers in U.S.S.R. **Note:** Data for U.S.S.R., Bulgaria, Czechoslovakia, East Germany, Hungary, Poland, and Romania.
**Source:** Central Intelligence Agency

## PRODUCTION GROWTH: Slowdown persists

| % annual change in gross output | 1981 | 1980 | 1979 | 1978 | 1977 |
|---|---|---|---|---|---|
| **U.S.S.R. and East Europe** | | | | | |
| All industry | 2.1% | 3.4% | 3.7% | 5.1% | 6.1% |
| **Bulgaria** | | | | | |
| All industry | 5.6 | 4.0 | 5.4 | 6.9 | 6.8 |
| Chemicals and rubber | 11.1 | 11.1 | 9.1 | 10.0 | 12.4 |
| **Czechoslovakia** | | | | | |
| All industry | 2.0 | 3.3 | 3.7 | 5.0 | 5.5 |
| Chemicals and rubber | 0.1 | 4.8 | 3.3 | na | na |
| **East Germany** | | | | | |
| All industry[a] | 5.1 | 4.7 | 4.8 | 3.7 | 5.4 |
| Chemicals and rubber | na | 3.8 | 4.0 | 6.0 | 4.3 |
| **Hungary** | | | | | |
| All industry | 2.3 | −2.1 | 3.0 | 4.9 | 6.6 |
| Chemicals and rubber | 2.0 | −2.1 | 6.1 | 10.7 | 6.9 |
| **Poland** | | | | | |
| All industry | −12.6[b] | 0.0 | 2.7 | 4.9 | 6.9 |
| Chemicals and rubber | na | 0.4 | 2.3 | 3.9 | 4.4 |
| **Romania** | | | | | |
| All industry | 2.6 | 6.1 | 8.0 | 9.6 | 12.5 |
| Chemicals and rubber | 4.0 | 6.8 | 1.4 | 10.6 | 13.9 |
| **U.S.S.R.** | | | | | |
| All industry[c] | 3.4 | 3.6 | 3.4 | 4.8 | 5.7 |
| Chemicals and rubber[c] | 5.0 | 5.6 | 2.3 | 6.0 | 6.5 |
| All industry[d] | na | 2.9[e] | 3.0 | 3.5 | 4.0 |
| Chemicals and rubber[d] | na | 5.2[e] | 0.2 | 3.6 | 5.2 |

a Industrial commodity production. b Sales at current prices. c Figures based on official Soviet statistics. d Figures based on Central Intelligence Agency estimates, giving lower results because of postulated upward bias in official figures. e Preliminary figure. na = not available.
**Sources:** United Nations Economic Commission for Europe, based on official national statistics, Central Intelligence Agency

## MAN-MADE FIBERS: Results mixed in 1981

| Production, millions of lb | 1981[a] | 1980 | 1979 | 1978 | Change 1980–81 |
|---|---|---|---|---|---|
| **NONCELLULOSIC FIBERS[b]** | | | | | |
| **Bulgaria** | 117 | 110 | 106 | 102 | 6% |
| **Czechoslovakia** | 183 | 168 | 159 | 163 | 9 |
| **East Germany** | 330 | 306 | 292 | 281 | 8 |
| **Hungary** | 48 | 39 | 40 | 41 | 23 |
| **Poland** | 262 | 348 | 338 | 335 | −25 |
| **Romania** | 320 | 300 | 309 | 287 | 7 |
| **U.S.S.R.** | 1345 | 1213 | 1049 | 1047 | 11 |
| **TOTAL** | **2605** | **2484** | **2293** | **2256** | **5%** |
| **CELLULOSIC FIBERS** | | | | | |
| **Bulgaria** | 86 | 80 | 73 | 68 | 8% |
| **Czechoslovakia** | 116 | 121 | 128 | 156 | −4 |
| **East Germany** | 373 | 372 | 364 | 360 | 0 |
| **Hungary** | 17 | 18 | 19 | 20 | −6 |
| **Poland** | 141 | 190 | 185 | 206 | −26 |
| **Romania** | 174 | 140 | 143 | 138 | 24 |
| **U.S.S.R.** | 1475 | 1433 | 1400 | 1400 | 3 |
| **TOTAL** | **2382** | **2354** | **2312** | **2348** | **1%** |

a Preliminary figures. b Excluding olefins and textile glass. **Source:** Textile Economics Bureau

## AGRICULTURAL CHEMICALS: Output off in Poland, Czechoslovakia, Bulgaria

| Thousands of metric tons | 1981 | 1980 | 1979 | 1978 | 1977 |
|---|---|---|---|---|---|
| **Bulgaria** | | | | | |
| Fertilizer supply[a] | 733[b] | 830 | 820 | 738 | 742 |
| Pesticide supply | na | 40.0 | 34.8 | 35.3 | 26.3 |
| **Czechoslovakia** | | | | | |
| Fertilizer supply[a] | 1,700 | 1,730 | 1,745 | 1,748 | 1,633 |
| **East Germany** | | | | | |
| Fertilizer supply[a] | na | 1,637 | 1,713 | 1,670 | 1,670 |
| Pesticide supply | na | 27.0 | 26.7 | 25.3 | 24.5 |
| **Hungary** | | | | | |
| Fertilizer supply[a] | na | 1,399 | 1,502 | 1,539 | 1,511 |
| **Poland** | | | | | |
| Fertilizer supply[a] | 3,490[b] | 3,635 | 3,567 | 3,606 | 3,586 |
| Pesticide supply | na | na | 44.7 | 49.8 | 57.1 |
| **Romania** | | | | | |
| Fertilizer supply[a] | 1,600 | 1,185 | 1,431 | 1,480 | 1,128 |
| **U.S.S.R.** | | | | | |
| Fertilizer supply[a] | 19,169[b] | 18,763 | 17,365 | 18,420 | 18,034 |
| Pesticide supply | na | 512 | na | na | na |

a Nutrient content. b Estimated. na = not available. **Sources:** United Nations Economic Commission for Europe, based on official national statistics, Department of Agriculture

## PRODUCTION: Growth continues for fertilizers and plastics in Eastern Europe

| Thousands of metric tons, unless otherwise noted | 1981[a] | 1980 | 1979 | 1978 | 1977 |
|---|---|---|---|---|---|
| **U.S.S.R.** | | | | | |
| **Sulfuric acid,** 100% | 24,100 | 23,030 | 22,364 | 22,411 | 21,104 |
| **Mineral fertilizers** (gross weight) | 108,000 | 103,858 | 94,523 | 97,976 | 96,752 |
| **Mineral fertilizers**[b] | 26,000 | 24,774 | 22,137 | 23,653 | 23,493 |
| Nitrogen[b] | na | 10,239 | 9,151 | 9,299 | 9,114 |
| Phosphate[b,c] | na | 6,471 | 6,344 | 6,153 | 6,024 |
| Potassium[b] | na | 8,064 | 6,635 | 8,193 | 8,347 |
| **Synthetic ammonia**[d] | na | 13,764 | 12,278 | 11,462 | 10,744 |
| **Sodium carbonate,** 100% | na | 4,800 | 4,782 | 4,858 | 4,876 |
| **Plastics**[e] | 4,100 | 3,638 | 3,478 | 3,516 | 3,309 |
| **Sodium hydroxide,** 100% | 2,800 | 2,755 | 2,680 | 2,763 | 2,658 |
| **Synthetic rubber**[f] | na | 1,880 | 1,867 | 1,795 | 1,700 |
| **Rubber tires**[g] (thousands of units) | 60,500 | 60,100 | 59,981 | 59,018 | 57,400 |
| **Pesticides** | 504 | 470 | 475 | 491 | 487 |
| **BULGARIA** | | | | | |
| **Sulfuric acid,** 100% | na | 859 | 998 | 974 | 860 |
| **Mineral fertilizers**[b] | na | 947 | 959 | 968 | 984 |
| Nitrogen[b] | na | 730 | 677 | 685 | 705 |
| Phosphate[b] | na | 217 | 282 | 283 | 279 |
| **Synthetic ammonia**[d] | na | 1,026 | 951 | 960 | 995 |
| **Plastics** | na | 250 | 200 | 178 | 169 |
| **Sodium hydroxide,** 100% | na | 161 | 107 | 102 | 96 |
| **Synthetic rubber** | na | 30 | 30 | 25 | 25 |
| **Rubber tires**[g] (thousands of units) | na | 1,982 | 1,752 | 1,734 | 1,830 |
| **CZECHOSLOVAKIA** | | | | | |
| **Sulfuric acid,** 100% | na | 1,284 | 1,253 | 1,195 | 1,276 |
| **Mineral fertilizers**[b] | na | 1,182 | 1,140 | 1,176 | 1,178 |
| Nitrogen[b] | na | 618 | 591 | 625 | 605 |
| Phosphate[b,c] | na | 361 | 358 | 367 | 389 |
| Potassium[b,h] | na | 203 | 199 | 191 | 184 |
| **Synthetic ammonia**[d] | na | 841 | 804 | 812 | 791 |
| **Plastics** | 913 | 894 | 853 | 810 | 738 |
| **Sodium hydroxide,** 100% | na | 326 | 312 | 311 | 312 |
| **Synthetic rubber** | na | 59 | 60 | 59 | 59 |
| **Rubber tires**[g] (thousands of units) | na | 6,714 | 6,581 | 6,439 | 6,341 |
| **EAST GERMANY** | | | | | |
| **Sulfuric acid,** 100% | na | 950 | 952 | 971 | 972 |
| **Mineral fertilizers**[b] | na | 4,773 | 4,740 | 4,628 | 4,470 |
| Nitrogen[b] | na | 940 | 875 | 892 | 838 |
| Phosphate[b,c] | na | 411 | 411 | 413 | 403 |
| Potassium[b] | na | 3,422 | 3,395 | 3,323 | 3,229 |
| **Synthetic ammonia**[d] | na | 1,159 | 1,079 | 1,137 | 1,130 |
| **Plastics** | na | 800 | 779 | 762 | 734 |
| **Sodium hydroxide,** 100% | na | 626 | 548 | 415 | 423 |
| **Synthetic rubber** | na | 170 | 165 | 145 | 147 |
| **Rubber tires**[g] (thousands of units) | na | 7,068 | 6,890 | 6,728 | 6,652 |
| **HUNGARY** | | | | | |
| **Sulfuric acid,** 100% | na | 614 | 613 | 690 | 678 |
| **Mineral fertilizers**[b] | na | 894 | 850 | 855 | 788 |
| Nitrogen[b] | na | 599 | 550 | 534 | 514 |
| Phosphate[b] | na | 150 | 165 | 185 | 165 |
| Potassium[b,h] | na | 145 | 143 | 136 | 109 |
| **Synthetic ammonia**[d] | na | 900 | 803 | 746 | 729 |
| **Plastics** | 311 | 328 | 294 | 213 | 148 |
| **Sodium hydroxide,** 100%[i] | na | 188 | 194 | 146 | 97 |
| **Rubber tires**[g] (thousands of units) | na | 870 | 750 | 773 | 814 |
| **POLAND** | | | | | |
| **Sulfuric acid,** 100% | na | 2,964 | 2,983 | 3,172 | 3,268 |
| **Mineral fertilizers**[b] | na | 2,239 | 2,431 | 2,621 | 2,610 |
| Nitrogen[b] | na | 1,295 | 1,376 | 1,470 | 1,521 |
| Phosphate[b] | na | 842 | 931 | 1,026 | 966 |
| Potassium[b,h] | na | 105 | 110 | 125 | 123 |
| **Synthetic ammonia**[d] | na | 1,438 | 1,530 | 1,616 | 1,665 |
| **Plastics** | na | 549 | 440 | 467 | 463 |
| **Sodium hydroxide** 100% | na | 415 | 436 | 469 | 440 |
| **Synthetic rubber** | na | 118 | 130 | 126 | 119 |
| **Rubber tires**[g] (thousands of units) | na | 8,743 | 8,500 | 7,852 | 7,457 |
| **ROMANIA** | | | | | |
| **Sulfuric acid,** 100% | na | 1,850 | 1,750 | 1,655 | 1,523 |
| **Mineral fertilizers**[b] | 2,640 | 2,451 | 2,522 | 2,461 | 1,981 |
| Nitrogen[b] | na | 1,689 | 1,738 | 1,723 | 1,381 |
| Phosphate[b] | na | 689 | 709 | 660 | 548 |
| Potassium[b,h] | na | 73 | 75 | 78 | 52 |
| **Synthetic ammonia**[d] | na | 2,267 | 2,333 | 2,259 | 1,793 |
| **Plastics** | na | 579 | 516 | 552 | 543 |
| **Sodium hydroxide,** 100% | na | 705 | 704 | 725 | 735 |
| **Synthetic rubber** | na | 150 | 149 | 148 | 136 |
| **Rubber tires**[g] (thousands of units) | na | 5,060 | 4,691 | 4,690 | 4,372 |

a Approximate figures. b Nutrient content basis, as N, $P_2O_5$, or $K_2O$. c Including production of ground phosphate rock for direct applications and phosphate animal feeds. d Nitrogen content. e Including resins for man-made fibers. f Estimated. g For all motor vehicle tires, excluding aircraft and bicycle tires. h Imported potash added to domestically produced nitrogen and phosphate to form multinutrient fertilizer. i Including regenerated NaOH. na = not available. Sources: Central Intelligence Agency, Department of Commerce, Department of Agriculture, United Nations Economic Commission for Europe (based on official national statistics)

## SOVIET FOREIGN TRADE: After steady growth, exports and imports of chemicals turn down

| $ Millions | 1981 | 1980 | 1979 | 1978 | 1977 | 1976 | 1975 | 1974 | 1973 | 1972 | 1971 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Exports**[a] | $79,377 | $76,470 | $64,913 | $52,395 | $45,227 | $37,269 | $33,401 | $27,374 | $21,332 | $15,409 | $13,792 |
| **Imports**[a] | 73,158 | 68,477 | 57,961 | 50,795 | 40,926 | 38,212 | 37,070 | 24,861 | 20,980 | 16,104 | 12,467 |
| **Trade balance** | 6,219 | 7,993 | 6,952 | 1,600 | 4,301 | −943 | −3,669 | 2,513 | 352 | −695 | 1,325 |
| **Chemical exports**[a] | na | 1,119 | 1,606 | 1,284 | 1,063 | 939 | 1,027 | 887 | 549 | 439 | 396 |
| **Chemical imports**[a] | na | 1,822 | 2,803 | 2,188 | 1,850 | 1,668 | 1,747 | 1,448 | 954 | 868 | 702 |
| **Chemical trade balance** | na | −703 | −1,197 | −904 | −787 | −729 | −720 | −561 | −405 | −429 | −306 |

a Free on board. na = not available. Sources: Central Intelligence Agency, Department of Commerce, based on official Soviet statistics and exchange rates

# 6 Western Pacific

## CHINA

### PRODUCTION: Slower growth in 1981 for most major products

| Thousands of metric tons | 1981 | 1980 | 1979 | 1978 | Change 1980–81 |
|---|---|---|---|---|---|
| **Ammonia**[a] | 11,990 | 12,150 | 10,727 | 9287 | −1.3% |
| **Fertilizer**[b] | 12,390 | 12,320 | 10,654 | 8691 | 0.6 |
| Nitrogen (N) | 9,860 | 9,990 | 8,821 | 7637 | −1.3 |
| Phosphate ($P_2O_5$)[c] | 2,510 | 2,310 | 1,817 | 1033 | 8.7 |
| Potash ($K_2O$) | 20 | 20 | 16 | 21 | 0 |
| **Sulfuric acid** | 7,810 | 7,640 | 7,000 | 6610 | 2.2 |
| **Sodium hydroxide** | 1,923 | 1,923 | 1,826 | 1640 | 0 |
| **Sodium carbonate** | 1,652 | 1,613 | 1,486 | 1329 | 2.4 |

a Nitrogen content of ammonia produced for fertilizer. b Nutrient content. c Including production of ground phosphate rock for direct application and phosphate animal feeds. **Sources:** State Statistical Bureau of the People's Republic of China, Central Intelligence Agency

| Thousands of metric tons | 1981 | 1980 | 1979 | 1978 | Change 1980–81 |
|---|---|---|---|---|---|
| **Calcium carbide** | 1,510 | 1,520 | 1,407 | 1237 | −0.7 |
| **Plastics** | 916 | 898 | 793 | 679 | 2.0 |
| **Insecticides** | 484 | 537 | 537 | 533 | −9.9 |
| **Ethylene** | 500 | 490 | 435 | 380 | 2.0 |
| **Synthetic detergents** | 478 | 393 | 397 | 324 | 21.6 |
| **Man-made fibers** | 527 | 450 | 326 | 285 | 17.1 |
| **Pharmaceuticals** | 37 | 40 | 42 | 41 | −7.5 |

### CHEMICAL IMPORTS: Fertilizers are biggest

| $ Millions[a] | 1980 | 1979 | 1978 | Change 1979–80 |
|---|---|---|---|---|
| **Fertilizers**[b] | $ 821 | $ 594 | $ 465 | 38% |
| Nitrogenous fertilizer | 501 | 496 | 354 | 1 |
| **Chemical elements and compounds** | 546 | 411 | 382 | 33 |
| Organic chemicals | 394 | 258 | 265 | 53 |
| **Plastic materials, resins** | 378 | 158 | 137 | 139 |
| **Dyeing, tanning, and coloring materials** | 79 | 88 | 70 | −10 |
| **Medicinal products** | 19 | 13 | 9 | 46 |
| **Essential oils, perfume, and cleansing materials** | 9 | 10 | 10 | −9 |
| **Mineral tar and crude chemicals**[c] | 0 | 11 | 12 | −99 |
| **Other chemicals**[d] | 179 | 159 | 100 | 13 |
| **TOTAL** | **$2031** | **$1444** | **$1185** | **41%** |

a Free on board. b Manufactured. c From coal, oil, and natural gas. d Includes explosives and pyrotechnic products, and chemical materials and products not elsewhere specified. **Source:** Central Intelligence Agency, estimated from data reported by China's trade partners

### CHEMICAL EXPORTS: Top $1 billion

| $ Millions[a] | 1980 | 1979 | 1978 | Change 1979–80 |
|---|---|---|---|---|
| **Chemical elements and compounds** | $ 488 | $276 | $141 | 77% |
| Organic chemicals | 281 | 168 | 85 | 67 |
| **Medicinal products** | 186 | 114 | 79 | 63 |
| **Essential oils, perfume, and cleansing materials** | 104 | 82 | 67 | 27 |
| **Explosives and pyrotechnic products** | 95 | 72 | 49 | 32 |
| **Plastic materials, resins** | 77 | 50 | 12 | 54 |
| **Dyeing, tanning, and coloring materials** | 66 | 46 | 35 | 45 |
| **Mineral tar and crude chemicals**[b] | 28 | 9 | 3 | 208 |
| **Fertilizers**[c] | 2 | 1 | 1 | 42 |
| **Other chemical products** | 184 | 129 | 84 | 43 |
| **TOTAL** | **$1230** | **$779** | **$471** | **58%** |

a Free on board. b From coal, oil, and natural gas. c Manufactured. **Source:** Central Intelligence Agency, estimated from data reported by China's trade partners

## TAIWAN

### INDUSTRY TRENDS: Chemical growth slows

| Industrial production indexes, 1976 = 100 | 1981 | 1980 | 1979 | 1978 | Change 1980–81 |
|---|---|---|---|---|---|
| **All manufacturing** | 169.3 | 163.2 | 153.0 | 142.8 | 4% |
| **Chemical materials** | 205.1 | 201.2 | 189.1 | 165.3 | 2 |
| Basic chemicals | 152.5 | 150.2 | 148.5 | 126.1 | 2 |
| Petrochemicals | 262.3 | 254.4 | 242.0 | 194.1 | 3 |
| Fertilizers | 124.0 | 134.6 | 127.9 | 125.9 | −8 |
| Synthetic fibers | 197.4 | 187.7 | 174.5 | 159.7 | 5 |
| Plastics and resins | 210.4 | 214.5 | 197.5 | 176.6 | −2 |
| **Chemical products** | 176.7 | 163.9 | 161.0 | 139.2 | 8 |

**Source:** Council for Economic Planning & Development, Taiwan

### FOREIGN TRADE: Big gains for chemicals

| $ Millions | 1981[a] | 1980 | 1979 | 1978 |
|---|---|---|---|---|
| **Exports**[b] | $22,611 | $19,811 | $16,103 | 12,687 |
| **Imports**[c] | 21,200 | 19,733 | 14,774 | 11,027 |
| **Trade balance** | 1,411 | 78 | 1,330 | 1,660 |
| **Chemical exports**[b] | 981 | 494 | 356 | 275 |
| **Chemical imports**[c] | 2,725 | 2,024 | 1,817 | 1,305 |
| **Chemical trade balance** | −1,744 | −1,530 | −1,461 | −1,030 |

a Estimated. b Free on board. c Includes cost, insurance, and freight. **Source:** Council for Economic Planning & Development, Taiwan

### PRODUCTION: Lower for several chemicals

| Thousands of metric tons, unless otherwise noted | 1981 | 1980 | 1979 | 1978 | Change 1980–81 |
|---|---|---|---|---|---|
| **Fertilizers**[a] | na | 2,092 | 1,979 | 1,959 | na |
| **Man-made fibers** | 687 | 633 | 587 | 540 | 9% |
| **Polyvinyl chloride** | 456 | 454 | 407 | 389 | 0 |
| **Synthetic detergents** | 94 | 104 | 105 | 86 | −9 |
| **Benzene**[b] | 137 | 145 | 153 | 129 | −5 |
| **Ethylene** | 443 | 458 | 445 | 366 | −3 |
| **Ethylene glycol** | 156 | 133 | 118 | 51 | 18 |
| **Propylene** | 204 | 213 | 205 | 164 | −4 |
| **Toluene**[b] | 172 | 153 | 134 | 95 | 12 |
| **Vinyl chloride** | 411 | 405 | 317 | 320 | 2 |
| **Xylene**[b] | 277 | 311 | 285 | 131 | −11 |
| **Ammonia,** anhydrous | 494 | 504 | 476 | 534 | −2 |
| **Ammonium sulfate** | 504 | 539 | 556 | 541 | −6 |
| **Calcium superphosphate** | 226 | 207 | 208 | 175 | 9 |
| **Hydrochloric acid** | 184 | 179 | 180 | 180 | 3 |
| **Oxygen**[c] | 174 | 159 | 141 | 107 | 9 |
| **Sodium hydroxide** | 357 | 400 | 420 | 362 | −11 |
| **Sulfuric acid** | 819 | 769 | 777 | 685 | 6 |
| **Urea** | 285 | 343 | 312 | 366 | −17 |

a In terms of 20% N, 18% $P_2O_5$, and 50% $K_2O$ fertilizer. b Millions of liters. c Millions of cubic meters. **na** = not available. **Source:** Council for Economic Planning & Development, Taiwan

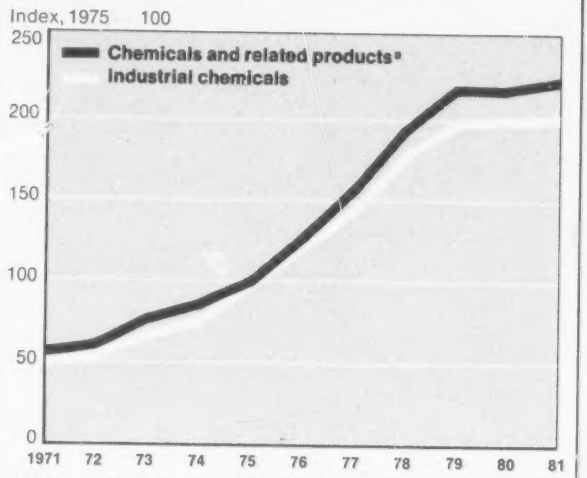
## KOREA

### INDUSTRY TRENDS: Chemicals gain modestly

| Index, 1975 = 100 | 1981 | 1980 | 1979 | Change 1980–81 |
|---|---|---|---|---|
| **Chemicals, petroleum, coal, rubber, and plastic products** | | | | |
| Production | 223.0 | 219.0 | 219.7 | 2% |
| Shipments | 195.2 | 194.3 | 191.6 | 0 |
| Inventories | 224.0 | 236.3 | 157.7 | −5 |
| **Industrial chemicals** | | | | |
| Production | 213.5 | 207.0 | 200.8 | 3 |
| Shipments | 227.5 | 217.7 | 193.7 | 4 |
| Inventories | 220.3 | 198.2 | 146.2 | 11 |
| **Other chemical products** | | | | |
| Production | 244.2 | 240.6 | 260.9 | 1 |
| Shipments | 243.7 | 236.3 | 251.8 | 3 |
| Inventories | 325.4 | 309.0 | 289.6 | 5 |
| **Rubber products** | | | | |
| Production | 243.8 | 273.1 | 244.0 | −11 |
| Shipments | 255.0 | 278.0 | 245.5 | −8 |
| Inventories | 260.2 | 336.4 | 152.8 | −23 |
| **Plastic products** | | | | |
| Production | 212.8 | 229.6 | 293.7 | −7 |
| Shipments | 215.6 | 234.2 | 292.5 | −8 |
| Inventories | 323.0 | 201.0 | 300.7 | 61 |
| **All manufacturing** | | | | |
| Production | 238.8 | 215.9 | 220.1 | 11 |
| Shipments | 234.1 | 212.7 | 212.0 | 10 |
| Inventories | 231.0 | 219.0 | 159.7 | 5 |

**Source:** Korean Bureau of Statistics

### Korean chemical output grows at slower pace in recent years




a Includes petroleum, coal, rubber, and plastic products.
**Source:** Korean Bureau of Statistics

### FOREIGN TRADE: Chemical exports decline

| $ Millions | 1981 | 1980 | 1979 | 1978 |
|---|---|---|---|---|
| **Exports**[a] | $21,254 | $17,505 | $15,056 | $12,711 |
| **Imports**[b] | 26,131 | 22,292 | 20,339 | 14,972 |
| **Trade balance** | −4,877 | −4,787 | −5,283 | −2,261 |
| **Chemical exports** | 682 | 780 | 532 | 341 |
| **Chemical imports** | 2,109 | 1,835 | 2,009 | 1,298 |
| **Chemical trade balance** | −1,427 | −1,055 | −1,477 | −957 |

a Free on board. b Includes cost, insurance, freight. **Source:** Korean Bureau of Statistics

### PRODUCTION: Agricultural chemicals slump

| Thousands of metric tons | 1981 | 1980 | 1979 | 1978 | Change 1980–81 |
|---|---|---|---|---|---|
| **Sulfuric acid** | 1294 | 1683 | 1645 | 1461 | −23% |
| **Complex fertilizers** | 1211 | 1439 | 1696 | 1658 | −16 |
| **Ammonia** | 908 | 1031 | 1169 | 1091 | −12 |
| **Urea fertilizers** | 1070 | 973 | 1166 | 1186 | 10 |
| **Polyvinyl chloride** | 287 | 232 | 192 | 131 | 24 |
| **Sodium carbonate** | 202 | 222 | 204 | 176 | −9 |
| **Fused phosphate** | 94 | 121 | 125 | 124 | −23 |
| **Insecticides** | 52 | 72 | 101 | 80 | −28 |
| **Synthetic detergents** | 58 | 64 | 70 | 64 | −9 |

**Source:** Korean Bureau of Statistics

## AUSTRALIA

### PRODUCTION: Generally lower last year

| Thousands of metric tons | 1981 | 1980 | 1979 | 1978 | Change 1980–81 |
|---|---|---|---|---|---|
| **Chemicals and acids** | | | | | |
| Hydrochloric acid | 59 | 63 | 58 | 53 | −6% |
| Nitric acid | 182 | 180 | 169 | 160 | 1 |
| Sulfuric acid | 1963 | 2175 | 1922 | 1799 | −10 |
| Ammonium sulfate | 211 | 203 | 212 | 217 | 4 |
| Superphosphate[a] | 3770 | 4202 | 3646 | 3388 | −10 |
| **Plastics and resins** | 747 | 727 | 614 | 522 | 3 |
| **Synthetic detergents** | 236 | 239 | 220 | 217 | −1 |
| **Unsupported plastics film, sheeting** | 126 | 132 | 118 | 106 | −4 |
| Polyethylene, low density | 81 | 86 | 74 | 65 | −5 |
| Polyvinyl chloride | 18 | 17 | 16 | 16 | 2 |

a Includes double and triple superphosphates and ammonium phosphate expressed in terms of single phosphate (22% $P_2O_5$ equivalent). **Note:** Years ending June 30. **Source:** Australian Bureau of Statistics

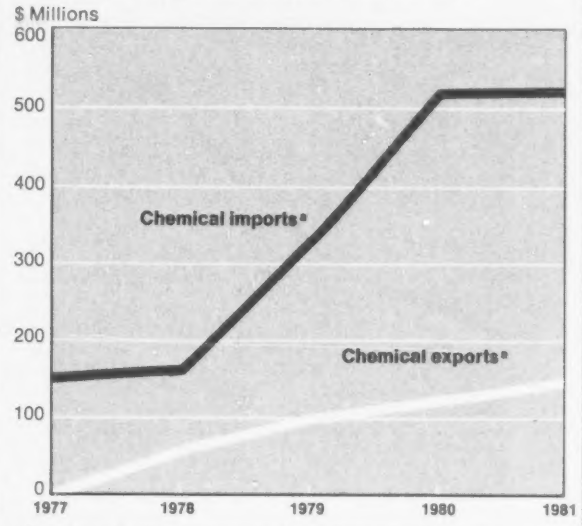
### FOREIGN TRADE: Chemical deficit widens

| $ Millions | 1981 | 1980 | 1979 | 1978 |
|---|---|---|---|---|
| **Exports**[a,b] | $22,328 | $21,078 | $16,221 | $13,865 |
| **Imports**[c] | 22,067 | 18,116 | 15,662 | 12,619 |
| **Trade balance** | 261 | 2,962 | 559 | 1,246 |
| **Chemical exports**[a,b] | 463 | 424 | 351 | 249 |
| **Chemical imports**[c] | 1,847 | 1,764 | 1,368 | 1,119 |
| **Chemical trade balance** | −1,384 | −1,340 | −1,017 | −870 |

a Free on board. b Includes re-exports. c Values as established for duty purposes, free-on-board basis. **Note:** Years ending June 30. **Source:** Australian Bureau of Statistics

## MEXICO

### Chemical imports outpace exports




a Pemex trade in primary petrochemicals only. **Source:** Petróleos Mexicanos

### PRODUCTION: Petrochemicals up sharply

| Thousands of metric tons[a] | 1981 | 1980 | 1979 | 1978 | Change 1980–81 |
|---|---|---|---|---|---|
| **Acetaldehyde** | 122.2 | 47.6 | 48.8 | 45.3 | 157% |
| **Acrylonitrile** | 54.0 | 54.3 | 23.3 | 19.1 | −1 |
| **Ammonia,** anhydrous | 2183.2 | 1883.2 | 1652.7 | 1579.2 | 16 |
| **Benzene** | 76.5 | 79.3 | 70.5 | 78.8 | −4 |
| **Butadiene** | 12.3 | 17.0 | 17.3 | 18.3 | −28 |
| **Cyclohexane** | 44.1 | 39.7 | 29.2 | 37.6 | 11 |
| **Cumene**[b] | 1.6 | 0 | 0 | 0 | — |
| **Dichloroethane** | 116.9 | 103.3 | 97.3 | 96.5 | 10 |
| **Dodecylbenzene** | 59.5 | 55.4 | 62.8 | 66.3 | 7 |
| **Ethane** | 1337.4 | 632.2 | 607.5 | 496.1 | 112 |
| **Ethylbenzene** | 29.1 | 29.3 | 32.6 | 36.6 | −1 |
| **Ethylene** | 378.3 | 365.5 | 342.7 | 258.0 | 4 |
| **Ethylene oxide** | 48.5 | 29.7 | 24.3 | 26.3 | 63 |
| **Hexane** | 65.6 | 60.1 | 53.4 | 29.2 | 9 |
| **Hydrochloric acid** | 33.2 | 36.1 | 31.9 | 34.7 | −8 |
| **Isopropyl alcohol** | 15.6 | 12.6 | 0.6 | 1.4 | 25 |
| **Methanol** | 179.7 | 173.6 | 147.0 | 102.8 | 4 |
| **Nitrogen**[b] | 29.5 | 0 | 0 | 0 | — |
| **Oxygen**[b] | 159.1 | 0 | 0 | 0 | — |
| **Polyethylene, high density** | 78.1 | 66.9 | 58.4 | 3.3 | 17 |
| **Polyethylene, low density** | 91.2 | 91.4 | 95.6 | 96.4 | 0 |
| **Propylene** | 156.2 | 136.9 | 159.9 | 138.4 | 14 |
| **Propylene tetramer** | 35.4 | 35.8 | 43.0 | 39.2 | −1 |
| **Styrene** | 32.9 | 31.3 | 31.2 | 37.8 | 5 |
| **Sulfur,** recovered | 425.5 | 402.4 | 249.4 | 168.0 | 6 |
| **Toluene** | 131.6 | 124.9 | 107.9 | 123.8 | 5 |
| **Vinyl chloride** | 56.9 | 62.5 | 55.7 | 55.8 | −9 |
| ***m*- and *p*-Xylene** | 86.6 | 77.2 | 66.0 | 76.1 | 12 |
| ***o*-Xylene** | 16.7 | 16.1 | 15.8 | 16.7 | 4 |

a Production of primary petrochemicals by Pemex. b New product. **Source:** Petróleos Mexicanos (Pemex)

### DOMESTIC SALES: Some chemicals strong

| Thousands of metric tons[a] | 1981 | 1980 | 1979 | 1978 | Change 1980–81 |
|---|---|---|---|---|---|
| **Acetaldehyde** | 123.7 | 100.9 | 58.1 | 59.1 | 23% |
| **Acrylonitrile** | 74.2 | 67.9 | 60.1 | 51.4 | 9 |
| **Ammonia** | 1204.8 | 966.8 | 885.7 | 798.9 | 25 |
| **Benzene** | 13.5 | 12.6 | 11.0 | 10.9 | 7 |
| **Butadiene** | 69.5 | 66.1 | 57.4 | 52.6 | 5 |
| **Cyclohexane** | 52.6 | 52.8 | 52.0 | 42.5 | 0 |
| **Dodecylbenzene** | 92.5 | 90.1 | 83.8 | 74.1 | 3 |
| **Ethylene oxide** | 77.9 | 70.5 | 56.6 | 60.7 | 10 |
| **Hexane** | 51.0 | 46.1 | 38.9 | 36.3 | 11 |
| **Isopropyl alcohol** | 31.3 | 27.8 | 21.4 | 19.0 | 13 |
| **Methanol** | 125.2 | 97.8 | 84.4 | 70.1 | 28 |
| **Perchloroethane** | 15.3 | 13.5 | 14.6 | 10.9 | 13 |
| **Polyethylene, high density** | 97.8 | 79.5 | 63.1 | 0 | 23 |
| **Polyethylene, low density** | 257.5 | 224.3 | 170.4 | 144.7 | 15 |
| **Styrene** | 116.9 | 101.2 | 99.2 | 74.6 | 16 |
| **Sulfur** | 427.5 | 408.0 | 243.2 | 133.9 | 5 |
| **Toluene** | 88.4 | 81.3 | 76.9 | 65.4 | 9 |
| **Vinyl chloride** | 144.7 | 148.1 | 119.8 | 102.2 | −2 |
| ***o*-Xylene** | 27.0 | 30.7 | 28.4 | 21.6 | −12 |
| ***p*-Xylene** | 186.8 | 116.4 | 96.7 | 87.2 | 60 |

a Domestic sales by Pemex of primary petrochemicals. **Source:** Petróleos Mexicanos (Pemex)

### CHEMICAL IMPORTS: Still rising for several

| Thousands of metric tons[a] | 1981 | 1980 | 1979 | 1978 | Change 1980–81 |
|---|---|---|---|---|---|
| **Acetaldehyde** | 5.9 | 58.2 | 10.2 | 16.7 | −90% |
| **Acrylonitrile** | 19.7 | 8.6 | 43.0 | 33.6 | 129 |
| **Benzene** | 21.0 | 14.5 | 19.9 | 13.8 | 45 |
| **Butadiene** | 55.0 | 54.8 | 34.4 | 39.7 | 0 |
| **Cyclohexane** | 7.9 | 10.1 | 20.3 | 11.9 | −22 |
| **Dichloroethane** | 1.7 | 14.3 | 9.0 | 14.7 | −88 |
| **Dodecylbenzene** | 32.8 | 41.3 | 31.5 | 15.3 | −21 |
| **Ethylbenzene** | 10.8 | 10.0 | 13.4 | 10.2 | 8 |
| **Ethylene** | 15.1 | 0 | 0 | 0 | — |
| **Ethylene oxide** | 31.1 | 34.4 | 25.3 | 35.3 | −10 |
| **Isopropyl alcohol** | 15.1 | 18.0 | 21.7 | 21.4 | −16 |
| **Perchloroethylene** | 16.7 | 5.5 | 15.1 | 12.9 | 204 |
| **Polyethylene, high density** | 10.2 | 26.0 | 5.8 | 38.3 | −61 |
| **Polyethylene, low density** | 125.9 | 104.0 | 35.9 | | 21 |
| **Propylene** | 24.3 | 20.3 | 0.2 | 0.6 | 20 |
| **Propylene tetramer** | 23.1 | 14.5 | 15.6 | 18.5 | 59 |
| **Styrene** | 87.8 | 76.7 | 72.7 | 36.5 | 14 |
| **Toluene** | 22.8 | 36.7 | 40.7 | 24.2 | −38 |
| **Vinyl chloride** | 84.3 | 88.8 | 62.8 | 56.9 | −5 |
| ***o*-Xylene** | 12.1 | 13.3 | 9.6 | 11.6 | −9 |
| ***p*-Xylene** | 148.0 | 94.5 | 82.3 | 42.9 | 57 |

a Imports by Pemex of primary petrochemicals. **Source:** Petróleos Mexicanos (Pemex)

## BRAZIL

### CHEMICAL EXPORTS: Plastics begin to move

| Thousands of metric tons | 1980 | 1979 | 1978 | 1977 |
|---|---|---|---|---|
| Acetone | 3.4 | 0.2 | 0.2 | 0.4 |
| Acrylonitrile | 20.0 | 0 | 0 | 0 |
| Dimethyl terephthalate | 9.5 | 10.7 | 5.7 | 0 |
| Perchloroethylene | 11.2 | 4.4 | 1.9 | 0 |
| *o*-Xylene | 23.2 | 3.5 | 0 | 0 |
| Sodium hydroxide | 24.1 | 38.0 | 17.2 | 3.2 |
| Sulfuric acid | [illegible] | 15.8 | 0.2 | 0.4 |
| Polyethylene, high density | 3.5 | 1.9 | 0 | 0 |
| Polyethylene, low density | 8.9 | 5.5 | 6.4 | 3.7 |
| Polypropylene | 11.0 | 7.5 | 0.1 | 0 |
| Polystyrene | 5.4 | 3.9 | 2.5 | 1.4 |
| Polyvinyl chloride | 3.1 | 0 | 0 | 0.1 |

**Source:** Associacao Brasileira da Industria Quimica e de Produtos Derivados (Abiquim)

### CHEMICAL IMPORTS: Plastics decline

| Thousands of metric tons | 1980 | 1979 | 1978 | 1977 |
|---|---|---|---|---|
| Benzene | 26.7 | 20.0 | 1.0 | 0 |
| Butadiene | 31.6 | 30.0 | 58.0 | 46.7 |
| Caprolactam | 17.8 | 13.0 | 11.9 | 30.9 |
| Styrene | 8.0 | 5.5 | 9.5 | 49.4 |
| Urea | 578.9 | 504.8 | 399.1 | 429.9 |
| Vinyl chloride | 86.7 | 78.3 | 67.3 | 55.5 |
| *p*-Xylene | 28.5 | 33.7 | 61.9 | 36.5 |
| Ammonia | 234.9 | 172.2 | 228.5 | 220.0 |
| Ammonium sulfate | 832.3 | 870.3 | 771.9 | 789.6 |
| Phosphoric acid | 1470.4 | 1094.8 | 1048.5 | 919.3 |
| Sodium carbonate | 203.4 | 200.7 | 183.7 | 143.7 |
| Sodium hydroxide | 12.0 | 18.8 | 40.0 | 173.3 |
| Polyethylene, high density | 4.4 | 17.8 | 24.0 | 20.3 |
| Polyethylene, low density | 32.3 | 11.0 | 31.8 | 30.5 |
| Polypropylene | 1.7 | 3.5 | 40.9 | 34.5 |
| Polyvinyl chloride | 26.1 | 99.2 | 61.2 | 52.1 |

**Source:** Associacao Brasileira da Industria Quimica e de Produtos Derivados (Abiquim)

### PRODUCTION: Sharp gains in past few years

| Thousands of metric tons | 1980 | 1979 | 1978 | 1977 | Change 1979–80 |
|---|---|---|---|---|---|
| **ORGANIC CHEMICALS** | | | | | |
| Benzene | 308.5 | 259.3 | 171.7 | 144.9 | 19% |
| Butadiene | 134.1 | 131.8 | 81.1 | 80.5 | 2 |
| Cumene | 124.3 | 98.8 | 98.3 | 97.5 | 26 |
| Dichloroethane | 137.9 | 47.6 | 0 | 0 | 190 |
| Ethylene | 715.5 | 631.2 | 398.8 | 362.2 | 13 |
| Ethylene oxide | 112.2 | 87.2 | 36.6 | 30.9 | 29 |
| Formaldehyde | 185.9 | 138.1 | 118.4 | 114.8 | 35 |
| Methanol | 126.6 | 107.2 | 95.2 | 81.3 | 18 |
| Phenol | 87.1 | 68.8 | 70.1 | 71.2 | 27 |
| Propylene | 418.1 | 376.6 | 237.8 | 232.5 | 11 |
| Styrene | 193.5 | 197.8 | 145.4 | 64.1 | −3 |
| Toluene | 103.6 | 82.0 | 72.2 | 67.5 | 26 |
| Urea | 273.1 | 151.9 | 113.4 | 78.0 | 80 |
| Vinyl chloride | 259.2 | 133.1 | 106.5 | 107.9 | 95 |
| *o*-Xylene | 75.9 | 66.5 | 33.2 | 28.7 | 11 |
| *p*-Xylene | 57.9 | 50.1 | 0 | 0 | 16 |
| **INORGANIC CHEMICALS** | | | | | |
| Ammonia | 443.7 | 338.9 | 258.8 | 184.0 | 31% |
| Ammonium sulfate | 163.7 | 89.1 | 59.1 | 40.2 | 84 |
| Chlorine | 628.3 | 587.1 | 536.4 | 313.2 | 7 |
| Hydrochloric acid | 108.2 | 153.5 | 178.6 | 159.9 | −30 |
| Nitric acid | 380.6 | 345.9 | 352.5 | 340.8 | 10 |
| Phosphoric acid | 328.4 | 200.6 | 179.6 | 180.9 | 64 |
| Sodium carbonate | 175.7 | 118.7 | 120.7 | 141.0 | 48 |
| Sodium hydroxide | 691.4 | 645.1 | 576.9 | 316.7 | 7 |
| Sulfuric acid | 2408.2 | 1910.3 | 1595.7 | 1556.3 | 26 |
| **PLASTICS** | | | | | |
| Polyethylene, high density | 128.7 | 119.1 | 52.9 | 53.6 | 8% |
| Polyethylene, low density | 307.4 | 290.3 | 218.5 | 199.5 | 6 |
| Polypropylene | 120.9 | 98.3 | 24.5 | 0 | 23 |
| Polystyrene | 124.5 | 132.7 | 95.8 | 85.4 | −6 |
| Polyvinyl chloride | 340.8 | 210.7 | 172.9 | 160.2 | 62 |

**Source:** Associacao Brasileira da Industria Quimica e de Produtos Derivados (Abiquim)

## VENEZUELA

### PRODUCTION: Basic chemicals grow fast . . .

| Thousands of metric tons | 1981 | 1980 | 1979 | 1978 | Change 1980–81 |
|---|---|---|---|---|---|
| Ethylene and propylene | 119.9 | 110.5 | 11.7 | 0 | 9% |
| Chlorine and caustic soda | 46.2 | 40.4 | 14.2 | 14.3 | 14 |
| Industrial acids[a] | 91.5 | 130.3 | 152.9 | 85.1 | −30 |
| Ammonia | 504.2 | 438.5 | 331.4 | 270.8 | 15 |
| Urea | 315.9 | 276.5 | 220.8 | 135.0 | 14 |
| Fertilizers | 167.7 | 164.2 | 63.1 | 60.9 | 2 |

a Sulfuric, hydrochloric, and nitric acids. **Source:** Petroquimica de Venezuela (Pequiven)

### CHEMICAL EXPORTS: Nitrogen fertilizers big

| Thousands of metric tons[a] | 1981 | 1980 | 1979 | 1978 | Change 1980–81 |
|---|---|---|---|---|---|
| Ammonia | 205.5 | 147.4 | 137.6 | 160.7 | 39% |
| Urea | 244.1 | 160.9 | 151.7 | 19.9 | 52 |
| Ethylene[b] | 23.2 | 23.4 | 0 | 0 | −1 |

a Exports by Pequiven of primary petrochemicals only. b Includes small amount of propylene. **Source:** Petroquimica de Venezuela (Pequiven)

### . . . and downstream products are catching on

| Thousands of metric tons | 1981 | 1980 | 1979 | 1978 | Change 1980–81 |
|---|---|---|---|---|---|
| Aluminum sulfate | 34.3 | 23.5 | 22.3 | 24.5 | 46% |
| Chlorofluoromethanes | 7.1 | 8.0 | 5.7 | 5.8 | −11 |
| Dodecylbenzene | 22.6 | 31.1 | 26.1 | 20.7 | −27 |
| Phthalic anhydride | 18.0 | 13.4 | 12.3 | 13.4 | 34 |
| Polyethylene, low density | 52.7 | 40.7 | 33.5 | 43.0 | 29 |
| Polystyrene | 30.5 | 32.3 | 25.2 | 21.5 | −6 |
| Polyvinyl chloride | 23.2 | 17.2 | 4.8 | 4.5 | 35 |
| Propylene tetramer | 13.8 | 11.6 | 0 | 0 | 19 |
| Sodium tripolyphosphate | 36.8 | 35.1 | 31.9 | 20.3 | 5 |

**Source:** Petroquimica de Venezuela (Pequiven)